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ENGINEERING AND
MINING JOURNAL-PRESS

A CONSOLIDATION OF ENGINEERING AND MINING JOURNAL AND MINING AND SCIENTIFIC PRESS

McGraw-Hill Company, Inc. Twenty-five Cents Per Copy

January 30, 1926

New Reverberatory Smelting Plant of United States Metals Refining Co.
By Frank R. Corwin

Classifying Mining Ventures
By George A. Packard

Biography of William Otis Hotchkiss

Freight Rates on Metals, Ores and Concentrates
Current Prices of Mining Supplies
Company Reports

Lead-Silver Ore,
from Keno Hill, Y. T.,
awaiting shipment down the Yukon

Mining Stocks—Week Ended January 16, 1926

Mining Stock quotations for week ended Jan. 9, appear on the preceding page

Stock	Exch.	High	Low	Last		Last Div.
COPPER						
Anaconda	New York	49⅞	46⅛	46⅞	Ja.16,Fe.23,Q	0.75
Arcadian Consol.	Boston	*90	*70	*70		
Ariz. Com'l	Boston	12⅜	12	12	Jy.21, Jy. 31 SA	0.50
Calaveras	N. Y. Curb	4	3⅛	3⅜		
Calumet & Arizona	New York	63¾	59	59	De.4, De.21 QX	1.50
Calumet & Hecla	Boston	15	14⅛	14⅛	Nov 30,De.15 Q	0.50
Cerro de Pasco	New York	61⅞	59⅛	59⅛	Ja. 14, Fe. 1, Q	1.00
Chile Copper	New York	35⅛	33⅛	33⅞	Dec.2, Dec.28, Q	0.62½
Chino	New York	18⅜	18⅛	18¼	Sept., 1920	0.37½
Con. Coppermines	N. Y. Curb	2	1⅞	2		
Copper Range	Boston	19⅜	18⅜	18⅜	May, 1925	1.00
Crystal Copper	Boston Curb	*47	*44	*46		
East Butte	Boston	3⅜	3⅛	3⅛	Dec., 1919	0.50
First National	Boston Curb	*20	*20	*20	Feb., 1919	0.15
Franklin	Boston	*1	*1	*1		
Granby Consol	New York	21⅞	19⅜	19⅞	May, 1919	1.25
Greene-Cananea	New York	12⅜	12¼	12⅜	Nov., 1920	0.50
Hancock	Boston			*80		
HoweSound.new,r.t.c.	New York	29⅛	27⅛	29⅛	Oc.5, Oc. 15 Q	0.50
Inspiration Consl.	New York	25⅛	23⅞	23⅞	De.17, Ja.4, Q	0.50
Iron Cap	Boston Curb	2	1⅞	2	May, 1923	0.15
Isle Royale	Boston	12	11⅜	11⅜	No.30, De.5	1.00
Jerome Verde Dev	N. Y. Curb	1⅛	*99	1⅛		
Kennecott	New York	56⅜	54	54⅛	De.4,Jan.2 Q	1.00
Lake Copper	Boston	1⅜	1	1	June, 1925	0.50
Magma Copper	New York	43	41⅞	41⅞	De.31, Ja.15,	0.75
Mason Valley	N. Y. Curb	2	1⅞	1⅞		
Mass Consolidated	Boston			*60	Nov., 1917	1.00
Miami Copper	New York	12⅜	12	12⅛	Feb.1, Feb.15 Q	0.25
Mohawk	Boston	33⅜	32	32	Jan. 30, Mar. 1	1.00
Mother Lode Coa	New York	7⅛	7	7	De. 11, De. 31	0.37½
Nevada Consol	New York	13⅛	12⅝	12⅝	De. 18, De.31 Q	0.25
New Cornelia	Boston	20⅛	20	20⅛	No.6, No.23 Q	0.25
North Butte	Boston	3⅜	3⅛	3⅛	Oct., 1918	0.25
Ohio Copper	N. Y. Curb	*75	*67	*75	No. 14, De. 2	0.05
Old Dominion	Boston	18	17⅛	18	Dec., 1918	1.00
Phelps Dodge	Open Mar.	†125	†123		De.21, Ja.2 Q	1.00
Quincy	Boston	21	20⅛	21	Mar., 1920	1.00
Ray Consolidated	New York	12	11⅝	11⅞	Dec., 1920	0.25
Ray Hercules	N. Y. Curb			14		
St. Mary's Min. Ld.	Boston	35⅛	34⅜	34⅞	May, 1925	3.00
Seneca Copper	New York	9⅛	8⅛	8⅛		
Shannon	Boston	*60	*50	*57	Nov., 1917	0.25
Shattuck Arizona	New York	67	64⅝	64⅝	Jan., 1920	0.25
Superior & Boston	Boston	1	1	1		
Tenn. C. & C.	New York	14⅛	13⅛	13⅜	De.31, Ja.15,Q	0.25
United Verde Ex.	N. Y. Curb	28	27⅜	27⅞	Ja.5, Fe.1, Q	0.75
Utah Copper	New York	98	98	98	De.18, De.31, Q	1.25
Utah Metal & T.	Boston	*93	*69	*80	Dec., 1917	0.30
Victoria	Boston	*50	*45	*45		
Walker Mining	Salt Lake	1.50	1.42½	1.42½		
NICKEL-COPPER						
Internat. Nickel	New York	45⅛	43	43¼	De.17,De.31,Q	0.50
Internat. Nickel, pfd.	New York			102	Ja.25, Fe.1, Q	1.50
LEAD						
Gladstone M. M. Co.	Spokane	*34⅜	*34⅛	*34⅛	No. 1, No. 10 M	0.01
National Lead	New York	171	166	166⅞	De.11, De.31 Q	2.00
National Lead pfd.	New York	116⅛	116	116	Aug.21, Se.15	1.75
St. Joseph Lead	New York	45⅛	43⅛	43⅛	De.10, De.20 QX	1.50
ZINC						
Am. Z. L. & S.	New York	9⅛	9	9	May., 1920	1.00
Am. Z. L. & S, pfd.	New York	42⅛	38⅛	39	Nov., 1920	1.50
Butte C. & Z.	New York	5⅞	5⅛	5⅛	De.10, De.24	0.50
Butte & Superior	New York	16⅛	15	15	De.15, De.31 Q	0.50
Callahan Zn-Ld	New York	2⅝	2⅛	2⅛	Dec., 1920	0.50
Eagle Picher	Cincinnati	34⅛	33⅜	33⅜	De.1, De.31	0.40
Eagle Picher, pfd.	Cincinnati			110		
New Jersey Zn.	N. Y. Curb			208	No.20, Dec.10 X	2.00
United Zinc	N. Y. Curb			*70		
Yellow Pine	Los Angeles	*37½	*34	*34	Se.10 Se.21 Q	0.04
GOLD						
Alaska Juneau	New York	1⅛	1⅛	1⅛		
Argonaut	Toronto	*23	*19	*19		
Barry-Hollinger	Toronto	*24	*22	*23		
Carson Hill	Boston	*50	*50	*50		
Consol. W. Dome L.	Toronto	*25	*21½	*22		
Cresson Consol. G.	N. Y. Curb	2⅛	2⅛	2⅛	De.31, Ja. 7	0.10
Crown Reserve	Toronto	*22	*18	*20	Jan., 1917	0.05
Dome Mines	New York	16⅜	16	16	De.31, Ja.20, Q	0.50
Golden Center	N. Y. Curb	2½	2½	2½		
Golden Cycle	Colo. Springs	†1.59	†1.58		No.30, Dec.10 Q	0.03
Hollinger Consol.	Toronto	19.20	18.60	19.00	Ja. 12, Ja. 28	0.08
Homestake Mining	New York	50	49½	50	Ja.20, Ja.25 XM	1.50
Kirkland Lake	Toronto	*97½	*90	*93		
Lake Shore	Toronto	11.50	9.97	11.00	De.1, De.15 XQ	0.10
McIntyre-Porcupine	New York	24⅛	23⅛	23⅛	Fe.1, Ma.7	0.05
Newray	Toronto	*44	*41½	*44		
Night Hawk Pen.	Toronto	9⅛	8	8		
Noranda	N. Y. Curb					
Portland	Colo. Springs	†*65	†*63½		Oct., 1920	0.01
Rand Mines	New York			33⅜	Au.17, Au.25	1.52
Teck-Hughes	Toronto	3.75	3.00	3.60	Ja. 15, Fe. 1	0.05
Tom Reed	Los Angeles	*55	*55	*55	Ma.10 Ma. 20	0.02
Tough-Oakes	Toronto	*53	*51	*53		
United Eastern	N. Y. Curb	*47	*43	*47	July, 1924	0.05
Vipond Cons.	Toronto	1.81	1.69	1.75		
Wright-Hargreaves	Toronto	8.60	7.95	8.35	De.15, Ja. 1 QX	0.10
Yukon-Alaska Trust	N. Y. Curb	23⅞	21⅛	21⅛		
GOLD AND SILVER						
Carnegie Metals	Pittsburgh	17	16	16½		
Con. Cortez	N. Y. Curb	*6	*6	*6		
Con. Virginia	San Francisco					
Continental Mines	N. Y. Curb			*45		
Dolores Esperanza	N. Y. Curb	*84	*80	*81	July, 1923	0.05
Premier Gold	N. Y. Curb	2 3/16	2⅛	2⅛	De.18, Ja. 4	0.08
Tonopah Belmont	N. Y. Curb	3⅛	3	3⅛	Se.15, Oc.1	0.05
Tonopah Extension	N. Y. Curb	1 3/16	*95	1⅛	Apr. 1925	0.05
Tonopah Mining	N. Y. Curb	6	5⅛	6	Se.30, Oc.21	0.07½
Unity Gold	N. Y. Curb			*20		
West End Consol.	N. Y. Curb	*20	*20	*20	Mar., 1923	0.05
Yukon Gold	N. Y. Curb	*64	*60	*60	June, 1918	0.02

Stock	Exch.	High	Low	Last		Last Div.
SILVER						
Alvarado	N. Y. Curb			*76	Oct., 1920	0.50
Beaver Consol	Toronto	*55	52⅛	*55	May. 1920	0.03
Castle-Trethewey	Toronto	1.65	1.51	1.56		
Coniagas	Toronto	4.50	4.05	4.25	May, 1924	0.12½
Keeley	Toronto	1.67	1.63	1.67	Ma. 1, Ma.15 X	0.12
Kerr Lake	N. Y. Curb	1⅛	1⅛	1⅛	Oc. 1, Oc.15 Q	0.12½
La Rose	Toronto	*39	*35½	*36	Apr., 1922	0.10½
Lorrain Trout Lake	Toronto	1.10	1.10	1.10	Jy. 2, Jy. 15	0.05
McKinley-Dar.-Sav.	Toronto	*26	*20	*24	Oct., 1920	0.03
Mining Corp. Can.	Toronto	*58	*48	*48	Ja. 16, Ja.30	0.12½
Nipissing	N. Y. Curb	7⅛	6⅛	6⅞	De.31, Ja.2, Q	0.15
Temiskaming	Toronto	*15½	*15¼	*15¼	Jan., 1920	0.40
SILVER-LEAD						
Ahumada	New York	8⅞	8¼	8⅜	De.15,Ja.2, X	0.25
Alta Merger	Salt Lake	†4	†2			
Bingham Mines	Boston	53⅛	51⅛	52⅛	De.19, De.20 Q	1.00
Cardiff M. & M.	Salt Lake			*55	De.16, No.18	0.10
Chief Consol	Salt Lake	3.75	3.70	3.75	Fe. 1,	0.10
Emma Silver	Salt Lake	†1⅜	†1			
Erupcion	Boston Curb	2⅛	1⅞	1⅞	De.15, Ja.2, X	0.10
Federal M. & S.	New York	106	102	102	No.25, De.15 Q	1.75
Federal M. & S., pfd.	New York	104⅞	96⅛	96⅛	Au.25, Se.15	1.75
Hawthorne Mines	N. Y. Curb	*20	*18	*19		
Hecla Mining	N. Y. Curb	18	17⅞	17⅞	No.15, De.15 Q	0.50
Iron King Mining	Salt Lake	*37	*36	*36		
Keystone Mining	Salt Lake	*57	*53	*54	Au.12, Au.26	0.07½
Lucky Jim	Spokane	*14	*13⅛	*13⅛		
Mammoth Mining	Salt Lake	2.97½	2.90	2.90	De. 16, De. 23	0.10
Marsh Mines	Spokane	*14⅛	*12	*12	Se.15, Oc.1	0.15
Ontario Silver	New York	10⅛	10⅛	10⅛		
Park Utah	Salt Lake	7.90	7.65	7.90	Se.15, Oc.1	0.15
Prince Cons	Salt Lake	8⅜	2	2⅜		
Silver King Coal	Salt Lake			9.75	De.15, Ja.2, QX	0.35
Silversmith	Spokane	*41⅛	*40	*41	De.31, Ja.10	0.02
Tamarack-Custer	Spokane	*65	*45	*53	Sept., 1924	0.25
Tintic Standard	Salt Lake	13.12½	13.00	13.01½	De.16,De.23,QX	0.50
Utah-Apex	Boston	8¼	7	7⅛	Ja.1, Ja.5, Q	0.35
Western Utah Copper	N. Y. Curb			*10		
IRON						
Bethlehem Steel	New York	49⅜	47⅛	48	July, 1924	1.25
Colorado Fuel & Iron	New York	36⅛	34⅛	35	May, 1921	0.75
Gt. North'n Iron Ore	New York	26⅛	25⅝	25⅝	De. 4, De. 28,	0.75
Inland Steel	New York	43⅛	42	42⅛	No.13, De.1 Q	0.62½
Mesabi Iron	N. Y. Curb	2⅛	2	2		
Replogle Steel	New York	15⅛	14⅛	14⅜		
Republic I. & S.	New York	62¼	57⅞	58	May, 1921	1.50
Republic I. & S. pfd.	New York	94¼	93⅛	94⅛	De.15, Ja.2, Q	1.75
Sloss-Sheffield S. & I.	New York	133	120	120	De.10, De.21 Q	1.50
Sloss-Shef. S.&I. pfd.	New York			103	De.21, Ja.2, Q	1.75
U. S. Steel	New York	137	132⅛	133⅛	No.28, De.30 XQ	1.75
U. S. Steel pfd	New York	126⅛	125⅜	126⅛	No. 3, No. 28, Q	1.75
Virginia I. C. & C.	New York	41	41	41	Jan., 1924	1.50
Virginia I.C.&C.pfd	New York	75	75	75	De.15, Ja.2,	2.50
VANADIUM						
Vanadium Corp.	New York	31⅛	31	31⅛	No.2, No.16 Q	0.50
ASBESTOS						
Asbestos Corp.	Montreal	94	94	94	Se.30, Oc.15 Q	1.50
Asbestos Corp., pfd.	Montreal	116	114½	115	Se.30, Oc.15, Q	1.50
SULPHUR						
Freeport Texas	New York	23⅛	18⅝	23⅜	Nov., 1919	1.00
Texas Gulf	New York	122⅞	119½	122	De.1, De.15, QX	2.75
DIAMONDS						
De Beers Consol.	New York	28½	28⅛	28⅛	Ja.26, Fe.2	0.23
PLATINUM						
So. Am. Gold & P.	N. Y. Curb	4⅛	4⅛	4⅛		
MINING, SMELTING, REFINING AND GENERAL						
Amer. Metal	New York	55⅜	52⅝	52⅝	No. 20, De. 1, Q	1.00
Amer. Metal pfd	New York	116⅜	116⅛	116⅛	No. 21, De. 1, Q	1.75
Amer. Sm. & Ref.	New York	142⅛	136	136⅜	Ja.15, Fe.1,	1.75
Amer. Sm.&Ref.pfd.	New York	114⅛	114⅛	114⅛	Fe.5, Ma .1, Q	1.75
Consol. M. & S.	N. Y. Curb	191	187	187	De.31, Ja.15	0.75
Federated Metals	N. Y. Curb	21⅜	21	21		
Newmont Mining	N. Y. Curb	50⅝	49⅛	49⅜	De.31, Ja.15,	0.60
Southwest Metals	N. Y. Curb			2⅜		
U. S. Sm. R. & M.	New York	48⅜	46	47⅛	Ja.1, Ja.7, Q	0.87½
U.S. Sm. R.&M.pfd.	New York	48⅜	48⅛	48⅛	Ja.1, Ja.7, Q	0.87½

* Cents per share. † Bid or asked. Q, Quarterly. SA, Semi-annually. M, Monthly. K, Irregular. I, Initial. X, Includes extra. The first date given is that of the closing of the books; the second that of the payment of the dividend.

Boston quotations courtesy Boston Stock Exchange; Toronto quotations those of the Standard Stock Exchange of Toronto, by courtesy of Arthur E. Moysey & Co.; Spokane, Pohlman Investment Co.; Salt Lake, Stock and Mining Exchange and George H. Watson & Co.; Colorado Springs, Colorado Springs Stock Exchange.

LONDON QUOTATIONS, WEEK ENDED JANUARY 9, 1926

	High	Low	Last	Date	Per Cent
Aramayo Mines (25 frs.)	81/3	80,—	80/—	Nov. 1925	5(c)
British Platinum	7/6	6/7½	7/—	Feb. 1925	2½
Burma Corpn. (10 rupees)	19/4½	18/9	19/—	Feb. 1926	6 annas.*
Bwana M'Kubwa	8/4½	7/9	8/1½		
Camp Bird	5/—	4/6	5/—		
El Oro	5/10½	5/7½	5/9	Nov. 1924	2½*
Esperanza	—/10	—/8	—/9		
Frontino & Bolivia	8/1½	7/6	7/6	Jan. 1926	1½
Mexican Corporation	23/6	21/6	23/		
Mexican Mines of El Oro	31/3	30/7½	31/—	Dec. 1925	12½*
Nechi (pref. 10s.)	1/6	1/—	1/6	1921-22	25
Oroville Dredging	4/—	3/9	4/—	Dec. 1923	3½
Ouro Preto	2/9	2/6	2/9	May 1925	2½
St. John del Rey	11/—	10/6	10/6	June 1925	6½
San Francisco Mines	32/4½	28/6	31/6	Jan. 1926	22½
Santa Gertrudis	22/9	21/—	22/6	July 1920	5
Selukwe (2s. 6d.)	12/9	11/9	12/3	April 1917	6¼
S. American Copper	5/4½	5/—	5/3	Nov. 1917	75
Tanganyika	49/3	46/—	46/10½	Sept. 1925	5
Tomboy	4/9	4/6	4/6	Sept. 1925	5
Union Minière du Haut-Katanga (Brussels) 100 Fr.	6.775	6.505	6.650	July 1925	150(b)

* Free of British income tax. (b) Belgian francs. (c) Swiss francs.

Volume 121 January 30, 1926 *Number* 5

ENGINEERING AND
MINING JOURNAL-PRESS

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883 Mission St., San Francisco, Calif. Colorado Building, Washington, D. C.

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Freight Rates

TRANSPORTATION costs are one of the big items in mining—especially where ore must be shipped long distances to the mill or smelter. Higher rates mean lower smelter returns, and very often the operation of a mine depends upon the cost of hauling the ore to the market.

Mining Journal-Press realizes that mining operators are keenly interested in knowing of any changes in freight rates, and therefore at intervals a full page is devoted to this subject.

IN THIS ISSUE you will find a tabulation of existing freight rates between important mining districts and points where smelters and refineries are located.

HIS tabulation will assist engineers in preparing reports, and mining operators in determining their profits.

McGRAW-HILL COMPANY, INC., Tenth Ave. at 36th St., NEW YORK, N.Y.

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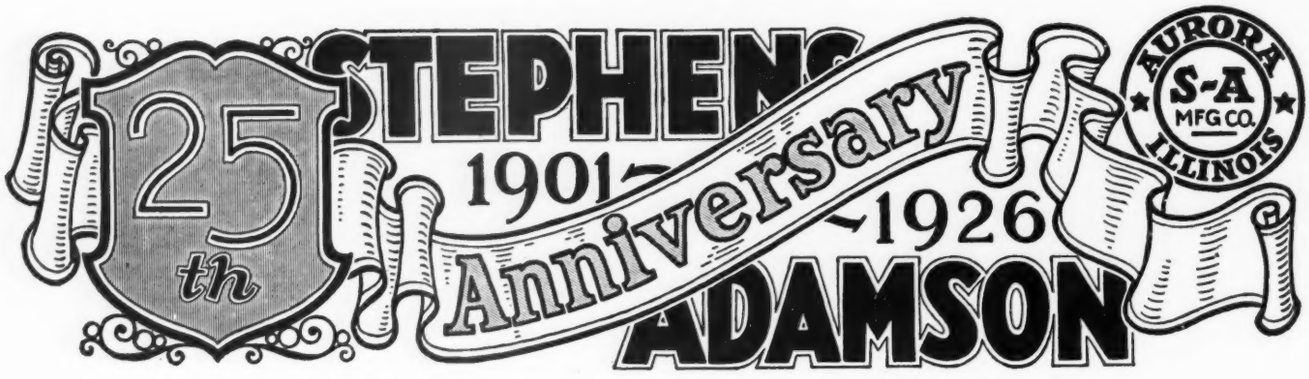
Cable Address: "Machinist, N. Y."
Copyright, 1926, by McGraw-Hill Company, Inc.
Publishers of
Engineering News-Record American Machinist
Power Chemical and Metallurgical Engineering
Coal Age Engineering and Mining Journal-Press
Ingeniería Internacional
Electrical World Electrical Merchandising
Bus Transportation Electric Railway Journal
Radio Retailing
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)

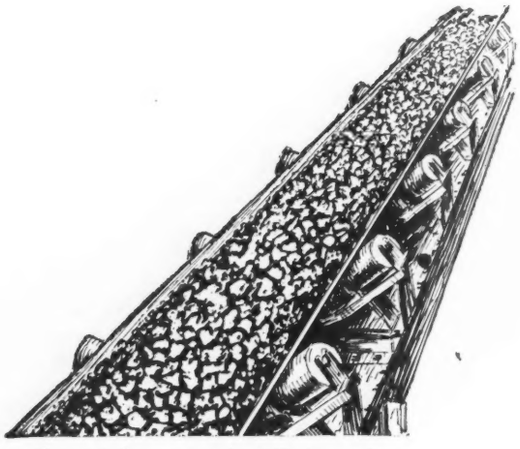
The annual subscription rate in the United States Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala, Chile, and Paraguay, $5 per year. Extra foreign postage, $3 (total $8 or 34 shillings). Single copy, 25c. Change of Address—When change of address is ordered the new and the old address must be given. Notice must be received at New York at least ten days before the change takes place.
Published weekly. Entered as second-class matter June 20, 1879, at the Post Office at New York, N. Y., under the Act of March 3, 1879.
Printed in U. S. A.
Member Audit Bureau of Circulations.
Member Associated Business Papers, Inc.

11,810 COPIES PRINTED THIS ISSUE



THE MARCH OF THE S-A BELT CONVEYOR

Belt conveyors easily retain their outstanding leadership when it comes to transporting large tonnages of bulk materials for long distances. These conveyors are not limited to horizontal installations but may be operated up or down inclines, ranging sometimes as high as 20 degrees from the horizontal. Where originally the first conveyors were narrow and operated at slow speeds, the present belts are furnished up to 60 inches in width and are operated at high speeds in many cases to carry very large capacities.



Several important installations of 1925 have definitely established the economies of long distance belt conveyor transportation.

STEPHENS-ADAMSON MFG. CO.
AURORA, ILLINOIS
LOS ANGELES, CAL.

STEPHENS-ADAMSON
S-A BELT CONVEYORS

ENGINEERING AND
MINING JOURNAL-PRESS

JOSIAH EDWARD SPURR, Editor

Volume 121 New York, January 30, 1926 *Number* 5

Alaska's Road Appropriation

NEEDING ROADS as much as it ever did, or more, Alaska will have, to spend on them during the next fiscal year, only two-thirds as much as it has during the year expiring June 30 next, if General Lord, wielder of the budget axe, has his way. Last year the territory received an appropriation of $900,000 for roads. It now asks $1,700,000, which has been cut to $600,000. To the Director General of a budget an appropriation sought is no doubt merely something to be cut, irrespective of the purpose for which it is required. The rôle of Washington is his, with the appropriation as his cherry tree. The cut in the appropriation asked by the Alaska Roads Commission is justifiable only on two possible grounds—namely, the government cannot find the money and the proposed roads are unnecessary. As to the first, this country is so well to do that taxation is steadily being decreased. The second is not applicable, as the fact that the development of Alaska is retarded by the lack of transportation is too well known to be denied.

To develop Alaska's extensive mineral resources, on which the territory's future prosperity depends, good roads must be constructed. Development without good roads is not possible, as it was in the winning of the West. Then the covered wagon went over trackless stretches, finding its own road as conditions made it most desirable. But in Alaska, owing to the different climate, the surface soil is oftentimes too soft during the summer months to support wheeled vehicles, and graded highways are required. Thus it is that, valuable as the Alaska Railroad is to the development of the interior and useful as the Richardson Highway is as a trunk road crossing the great valleys of that region, neither is as valuable or as useful as it might be, because of the lack of feeder roads. These must be constructed if districts remote from the trunk lines mentioned are to be made easy of access so that supplies may be freighted in and mineral products taken out. Indeed, the small tonnage carried by the Alaska road is due to the lack of such feeder roads. Congress will do well to grant the amount asked by the Roads Commission instead of permitting it to be arbitrarily cut simply as a routine matter.

The Cost of Educating Engineers

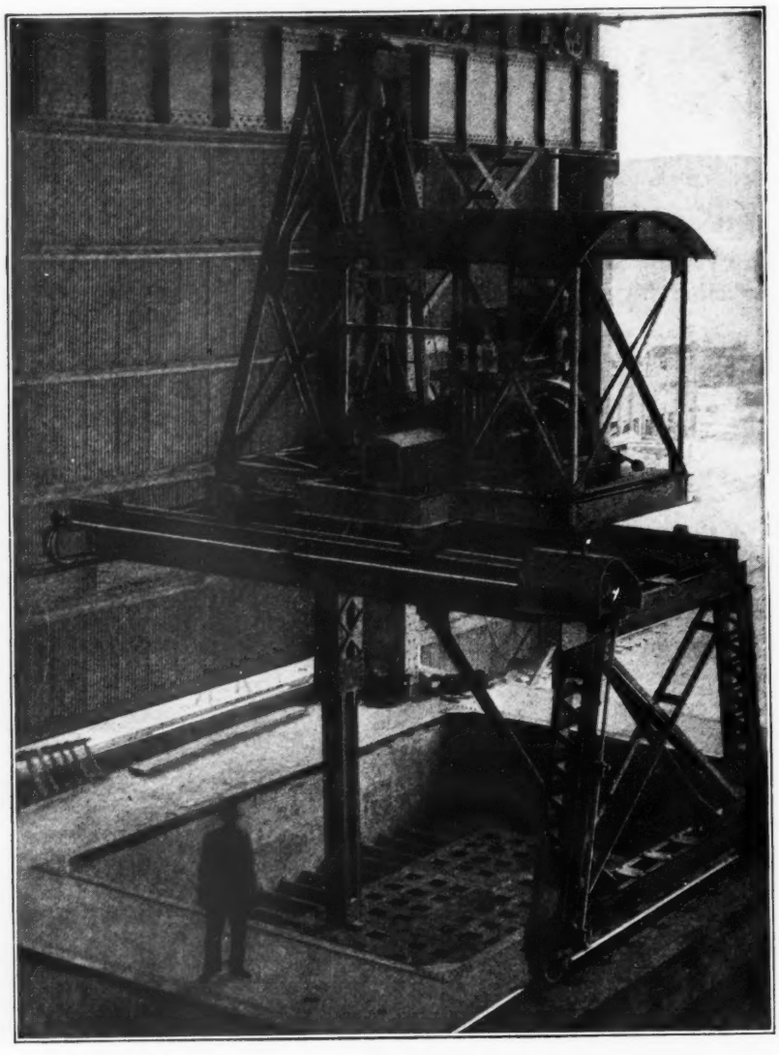
WHAT IT COSTS a college in the United States to educate an engineer has been made the subject of investigation by the Society for the Promotion of Engineering Education. The data have been compiled from thirty-three institutions, with a total enrollment of 24,984 engineering students, which was about 44 per cent of the entire engineering enrollment in 1923-24. The institutions investigated fell into four classes: Endowed universities, endowed polytechnic institutes, state universities, and land-grant colleges. Of these it is considered that the second—polytechnic institutes—afford the most reliable data, because they naturally include all items of cost, with the exception of interest on plant. In these institutions the average annual cost per student is put at $551, as against $298 for the land-grant colleges, $358 for state universities, and $582 for endowed universities. Altogether, the total cost of engineering education per year in the United States is approximately $30,000,000.

These figures, interesting as they are, will not attract the prospective student of engineering so much as the more intimate question how much it will cost him personally to get an engineering education. And in that problem there will be found to be many highly variable factors. Certainly, however, the cost of getting a college education, engineering or otherwise, has gone up since the last generation, and in a degree even greater than the general cost of commodities and living, as indicated by the decrease of the purchasing value of the dollar as compared with pre-war days. While the general cost of things has gone up some 60 per cent, it seems likely that the cost per student of a college education has nearly doubled. This is shown in higher tuition, higher rents and board, and other items. A generation ago the commons in a certain institution set an abundant table, with excellent service, at $4 a week. Nowadays, more meager fare in the same institution costs between $8 and $9 per week. The cost of service is one of the great items which is revolutionizing college life, as it is American life in general. The cafeteria, an economical but crude and unsatisfactory institution, once a joke, but now an essential expedient, has replaced the dining room in most of our colleges. Students no longer dine; they eat. And this is an example of countless shortcuts which have nevertheless been unable to cut down living costs for the student.

Did Silver Go Up or Down?

MINERS OF SILVER the world over realized considerably more for their product during 1925 than during 1924. Yet a conclusion exactly opposite would be reached by the peruser of the current annual reviews of the silver market by two of the four well-known London metal brokers, who meet each business morning to decide for the expectant world what shall be the official price of silver for that day. Messrs. Mocatta & Goldsmid observe, "There have been no purchases for the Home Mint nor for the Indian Government, and in view of the fact that the Continental purchases have been so much smaller, it is not surprising that the average price for the year is 1⅞d. lower than that for 1924." Messrs. Sharps & Wilkins say, "The average price has worked out at 32⅛d. per ounce Standard, as compared with 34d. in the previous year." Neither makes any mention of the price in New York.

There are in Britain a great many shareholders in silver mines situated in Canada, Mexico, India, and elsewhere who might be led to believe, if they were to read these reviews, that the silver market had been downward instead of upward bent. As is well known, we on



SKULLS

Skulls are formed in matte and slag ladles. How many tons do you break up annually for resmelting?

If you are using hand labor it will be worth while looking into

The McGregor Skullbreaker

The machine is in successful operation in a number of smelting plants.

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this side of the Atlantic await each day the arrival of cables from London announcing the verdict of these London brokers. Then, by translating their figure, expressed in pence per ounce "Standard," to cents per ounce 999 fine, we obtain the recognized quotation for the day. How, one may fairly ask, can London decline 1⅞d. when the New York average rose from 66.781c. in 1924 to 69.065c. in 1925? The explanation is this: the average price for sterling exchange rose from 441.397c. in 1924 to 482.426c. in 1925. It is only necessary to adjust the London prices in pence to its equivalent in terms of American dollars—the real world standard of value in the last few years—to show that the value of silver actually increased in London as well as in New York.

Expanding the Activities of Copper Producers

THAT the wire and sheet copper mills and the brass works, in the United States, have been reaping handsome profits during the last decade while the producers of crude copper have had to be satisfied with much more modest returns was brought out in a paper prepared by Arthur Notman and summarized in last week's issue of *Mining Journal-Press*. The paper was read at the New York section meeting of the A.I.M.E., and it was the general consensus of opinion that it might indeed be well for copper producers to take more interest in the manufacturing branch of the industry. But this is more easily said than done.

Anaconda showed excellent foresight and judgment in acquiring the American Brass Co. four years ago. The price paid was one that was apparently fair to all parties concerned, but it must be remembered that industrial conditions at the end of 1921 were not so favorable as now. Had Anaconda waited until now to consummate such a transaction, the terms would almost certainly have been much less attractive. Other brass and wire companies are fully cognizant of their excellent position and in no mood to put themselves on the bargain counter for the benefit of a copper producer anxious to increase his profits and stabilize his business. Should they be approached, their price would no doubt liberally discount future expected prosperity. There are good factual grounds for believing this, as Mr. Notman's suggestion was actually carried out in negotiations between Calumet & Hecla and one of the Detroit copper and brass companies a few months ago. A union of these Michigan companies would have held advantages for both, but apparently the price asked was too high and the project was finally abandoned.

The alternative, of course, is for the copper producer to build his own manufacturing plant. There may be room for another such plant, in a carefully considered location, but to add another to the present works would tend to over-expand production facilities and thus defeat its own ends. The existing plants seem well able to take care of the demand, and a new one of any importance would have to cut prices in all probability to establish its market; and the competition thus awakened might easily, especially in the duller times that are almost certain to come along in the next two or three years, seriously interfere with profits on the investment. Copper producers know all about over-expanded production facilities, from bitter experience, and are in no mood to further this condition.

A facetious suggestion was privately offered by one of those who heard Mr. Notman's paper, based on the troubles that certain wire drawers have had with some of the wire bars offered them by the refineries in the last year or two. His idea was that the producers might see to it that independent manufacturers got a liberal proportion of unsatisfactory copper, reserving the real good stuff for their own manufacturing plants. Fortunately, under present conditions, the wire drawers cannot complain that this trick is being done.

Speaking seriously again, it is a fact that producers of raw materials exclusively seem to have more than their share of troubles. Farming, stock raising, and mining, in the last few years, have not been so generally prosperous as manufacturing and selling finished products. The companies that have widened their activities in the direction of a vertical integration of their industry have been almost uniformly successful. Perhaps the leading example in the mining field is the Aluminum Company of America, though this company was not mentioned in the discussion the other evening. Perhaps, at this time, it was not thought best to hold up the Aluminum company as an example of just the proper thing to do. But the other examples that were cited—the U. S. Steel Corporation, the International Nickel Co., and the National Lead Co.—have all made a success of manufacturing and selling as well as producing their raw materials, and to this list might well be added the New Jersey Zinc Co. The plan is a good one, and producers of crude copper may well keep it in mind.

High Wages and Low Costs

THROUGH EXPERIENCE rather than through theory, the knowledge of practical economics is extended. The restricted immigration laws of the United States were enacted for two motives: First, on the part of organized labor, to prevent such a constant influx of foreign labor as would demoralize wages, lower the standard of living, and invalidate the control through limited supply that the labor element had obtained; second, on the part of employers and the average American citizen, because they had lost faith in the "melting pot" and feared, with good reason, that the invading hordes would gradually absorb America and sap its institutions—and because of that they were willing to dispense with cheaper labor, and with nearly all domestic service.

The net result is working out rather swiftly and unexpectedly, in the lowering of costs of production, not through cheap labor but through increased efficiency of management and the increased use of mechanical power, as pointed out in a recent bulletin of the National Industrial Conference Board at New York. This bulletin states that:

> Total production toward the close of 1925 was 42 per cent greater than it had been at the low point of 1924, although only 16 per cent more workers were needed to accomplish this result. Their average "real" weekly earnings are about 25 per cent greater than they were before the war and about 7 per cent higher than at the peak of high wages in 1920. It means for the nation as a whole a larger wealth of goods to enjoy, and more capacity to enjoy them. A full purse for the wage earner, with an ample supply of the things he needs or desires, at reasonable prices. These are the elements of prosperity.
>
> Improved industrial organization and administration and the steadily increasing use of mechanical power are primarily responsible for the lowering of production costs; and reduced cost per unit of production has made it possible to maintain the existing high wage level without increasing prices and in some cases even permitting price reductions.
>
> It is the proper recognition of this fundamental relationship between high wages, low production costs, and domes-

tic consuming power, and the application of the principle involved, that largely determine the degree of our future prosperity. It will be a vital factor in continuing our economic progress, even in the face of increasingly keen foreign competition, while maintaining our existing, or even higher, standards of living.

Foreign Control of Tin

THE ELASTICITY of the price of rubber is in keeping with that physical characteristic of the commodity itself. Will the "cry of tin" reach such high notes as to cause a similar disturbance in the tin market as has been experienced in the rubber market? The United States is as destitute of tin as it is of rubber. Great Britain produces or controls about 70 per cent of the world's production of each, and London dictates the price.

The world's annual production of tin is about 133,000 tons, of which the United States requires at least 75,000 tons, or about 57 per cent, to meet the demands of commerce. For many of its uses there is no known substitute in adequate supply, especially in bronze and solder and certain uses to which tin plate is put. Tin deposits are limited in extent, known mines are becoming exhausted, and the demand for tin is increasing. The average price of tin in New York in 1922 was 32$\frac{5}{16}$c. per pound; 1923, 42$\frac{7}{16}$c.; in 1924, 50$\frac{7}{16}$c. and the average for December, 1925, was 61$\frac{7}{16}$c. per pound. It is not difficult to believe that tin eventually may sell much higher.

To the public it makes little difference whether the control is governmental or corporate, for it has to pay the price asked in each case or go without. As for tin, new deposits cannot be made, and no known orebodies of any extent exist that are not now being developed or exploited in foreign countries. Even though American capital develops deposits outside of the United States, it must be subject to the laws and economics of the land in which the ore occurs. To avoid a possible future international argument, similar to that caused by the rise of the price of rubber, economy in the use of tin should be practiced and research work undertaken to develop substitutes.

Fire Losses in the Mining Industry

LOSS BY FIRE can be covered by insurance. Loss from "waste in industry" cannot. The latter receives attention, but the former seems to be regarded as if it were inevitable. Three weeks ago, on Jan. 6, a small concentrator at Crestline, Kan., in the Tri-State zinc district, was burned—its cost was only $50,000—an insignificant event perhaps to a nation that thrills at nothing less than a million-dollar conflagration. But one wonders if the history of 1925 is about to be repeated. A year ago, on Jan. 20, a mill was burned at Picher, Okla., with $75,000 loss; on Feb. 11 at Baxter Springs, Kan., another burned, a loss of $100,000; six days later, at Crestline, Kan., a zinc and lead mill was destroyed, the loss being $50,000; and on Feb. 24 a barytes plant at Mineral Point, Mo., "went up" with $50,000. All this in Missouri, Kansas, and Oklahoma. Besides these losses, the history of the last year included the burning of a manganese concentrator at Philipsburg, Mont., the loss reported being $300,000; on July 8 a mine plant burned at Crystal Falls, in northern Michigan, and on Aug. 7 a storehouse in the Sudbury nickel district was lost and with it $150,000. These are by no means all of the conflagrations that occurred in 1925. But, if they were, it would be quite enough. The frequent fires in the Tri-State district give rise to speculation as to their probable cause. Within the district's boundaries are 170 mills, mostly small, which are often hastily erected and not infrequently moved from lease to lease. Conditions of this sort are likely to foster carelessness.

Frequent fires lead inevitably to an increase in insurance rates. In general, however, the insurance premium is too small an item to have a corrective or preventive influence where small plants are concerned. If every fire meant a heavy fine, with the possibility of criminal action, there would be fewer of them, no doubt. More than the cost of the structure and its equipment is lost when a mine plant burns. Production ceases, for a time at least, and unemployment follows, and the aggregate loss to the company and community is far greater than the so-called "fire loss" reported.

Cadmium Prices Now Apparently Stable

AMONG THE MINOR METALS, the industrial position of cadmium has been of more than ordinary interest in the last decade. Before the World War the price for several years was from 55 to 80c.—about the present level. At that time, production and consumption were much less than now, but were well balanced at a comparatively modest price. During the war, the scarcity of tin made the use of cadmium in solders of increasing importance, and the price rose to $1.50@$2 per lb. in 1918. Since then it has gradually come down to 60c. per lb., which has been generally maintained during the last two years. No further decline is to be expected unless an equivalent decline in tin prices occurs, and possibly, with increasing uses, its employment as a tin substitute might not govern the market.

Besides its use in solder, in many forms of which it is equally as beneficial as tin, and the use of its sulphide as a coloring material, cadmium has been found valuable in two other applications in the last few years. One is as a component of fusible plugs for fire protection, and the other as a protective of iron surfaces against rust. The cadmium is electro-plated on the iron and the whole then heated for several hours at 150 to 200 deg. C., thus forming an alloy with the iron. The process is controlled by the Udylite Co. of Kokomo, Ind., and nearly 100 plants are now licensed for this work. It has been particularly useful for rust-proofing locks, hardware, kitchen-cabinet and refrigerator trimmings, automobile parts, wire screen, wire ropes, and fence wire, as the finish is attractive and the coating is adaptable to further electro-plating if desired.

American production has increased through the establishment of electrolytic zinc plants, as cadmium is commercially recovered through its association with zinc. Australian production has recently increased by leaps and bounds for the same reason, and has been chiefly instrumental in lowering the price to the old level, despite the added outlet in industry. However, as already mentioned, no further price declines seem likely, and now that it has come down to a more moderate level than for ten years, manufacturers would be warranted in testing its adaption to new uses. In fact, the U. S. Bureau of Standards is reported to have carried out some work recently in coating iron and steel with cadmium by other than the Udylite process.

Engineers of Note

William Otis Hotchkiss

THE PRESIDENT of the Michigan College of Mines has for many years been an important factor in the road-building program of Wisconsin. William Otis Hotchkiss is primarily a civil engineer and geologist. As State Geologist he made a thorough study of road materials in Wisconsin, to which he has applied his engineering training, with the result that Wisconsin has a road system of which she may well be proud. The magnitude of the work is indicated by the fact that the fund available during the fiscal year ending June 30, 1926, is $5,964,000 for construction and improvements and $5,973,000 for maintenance. During all his years of active work as a geologist he has been a student of highway work. He traveled far and read exhaustively and was largely instrumental in securing the ratification of an amendment to the state constitution, thus making the state-aid law possible. The Highway Commission terms him the "Father of the highway movement in Wisconsin." For many years he has been recognized by the U. S. Geological Survey and other scientific organizations as a geologist of high standing and of rare ability. As a member of the War Minerals Committee during the war he was called to Washington to assist in planning for the development of mineral supplies that were lacking and badly needed at that time. It was at the request of a number of the alumni of the Michigan College of Mines that Mr. Hotchkiss was selected as president. They had confidence in his ability as a leader and administrator, and felt also that there would be no neglect of research work which is of so much importance to the mining industry.

Mr. Hotchkiss was born Sept. 17, 1878, at Eau Claire, Wis., and was graduated from the University of Wisconsin with the following degrees: B.S., in 1903; C.E. in 1908, and Ph.D. in 1916. He became connected with the State Geological Survey in 1906, was appointed State Geologist in 1909, and Director in 1918. With the organization of the Wisconsin Highway Commission in 1911 be became ex officio member of it. In 1923 he became chairman of the Wisconsin Highway Commission, from which he resigned recently to become president of the Michigan College of Mines.

Mr. Hotchkiss as a resident of Madison took an active interest in all civic affairs, and his absence will be felt there. He is a man of pleasing personality, a good mixer, and upon his resignation from the Highway Commission the resolution of commendation by the commission stated, "His activity in promoting all that was for the advancement and interest of highway work in the state has never abated and his influence on legislature and public sentiment, and actual accomplishments has been a great power in the highway movement. . . . He had vision without being visionary. He was firm without being stubborn, and tactful without compromising principles. Honest himself, he did not impugn the motives of others."

As president of the Michigan College of Mines, Mr. Hotchkiss has a field in which further to exercise his training, experience, tact, and skill in devising a curriculum that will meet the needs of a great industry, by training young men to become not only engineers, metallurgists, and chemists, but business men and civic leaders.

New Reverberatory Smelting Plant of the United States Metals Refining Co.

Modern Storage, Sampling, and Metallurgical Equipment Supersedes Old Blast-Furnace Plant—Arrangement of Waste-Heat Boilers a Feature

By Frank R. Corwin
Assistant Manager and Chief Engineer,
U. S. Metals Refining Co., Carteret, N. J.

Frank R. Corwin

FOR a number of years the United States Metals Refining Co., a subsidiary of the American Metal Co., Ltd., has had under consideration the building of a reverberatory smelting plant to replace the blast-furnace plant which has been in operation since 1907 at its Carteret, N. J., works. When the blast-furnace plant was built, the charge was principally crude ore, but within the last few years this condition has changed, and now the charge is made up principally of concentrates.

The bulk of the concentrates and ores comes to the plant in boatloads running from 4,500 to 6,000 tons. In the old plant these were dumped from a trestle into bins and then hand-shoveled into cars in the proper proportion to make up the charge, which made the handling cost excessively high. Then, dusting losses were high, owing to handling concentrates in the blast furnaces, and as high-sulphide ores had to be purchased, the large sulphur elimination in the blast furnaces tended toward high costs. The factors, together with the possibility of obtaining additional waste-heat steam, were the principal reasons that influenced the company in making a decision to change the plant over to reverberatory smelting.

The new installation consists of a 40,000-ton storage and bedding-bin building, a crushing and sampling plant, a Wedge roaster plant, and a reverberatory furnace equipped with waste-heat boilers, together with a Fuller-Lehigh pulverized-coal plant.

Crushing and Sampling Plant

As stated, most of the ores and concentrates for the United States Metals Refining Co.'s smelter arrive at Carteret either by steamer or by barge. The boats, after being placed at the smelter dock, are unloaded by locomotive cranes, and the ores and concentrates dumped into standard broad-gage cars which are hauled over a 100-ton railroad scale for weighing, to the unloading bins at the smelter trestle.

From the ore-unloading bin, the ores are fed to conveyor No. 1 (Fig. 1) by a Stephens-Adamson pan feeder 30 in. wide and 24 ft. long, having a variable speed of from 6.66 ft. to 13.33 ft. per minute. A 30-in. belt conveyor (No. 1) carries the ore from the unloading bin to the top of the crushing plant; it is equipped with a Dings magnetic pulley, which separates the tramp iron from the ore as it passes over the head pulley.

From conveyor No. 1 the ore is discharged into a 4x8-ft. Traylor trommel screen in the crushing plant. This trommel screen is a manganese-steel plate with 2½-in. holes. The oversize goes to a 21x24-in. Blake crusher and the undersize to a set of 54x20-in. Traylor rolls. The oversize after going through the Blake is also fed to the crushing rolls. The ore is then elevated by a bucket elevator having 8x18-in. buckets and traveling at a speed of 300 ft. per minute, to the top of the sample mill, where it is discharged from the elevator onto a Hum-mer No. 39 vibrating screen. All of the oversize material from this screen returns to the 54x20-in. rolls, the screen and rolls operating in closed circuit.

The sample is cut from the undersize from the screen (see Fig. 2) and the reject is fed to a belt conveyor (No. 2), which with belt conveyors 4, 5, and 6, takes

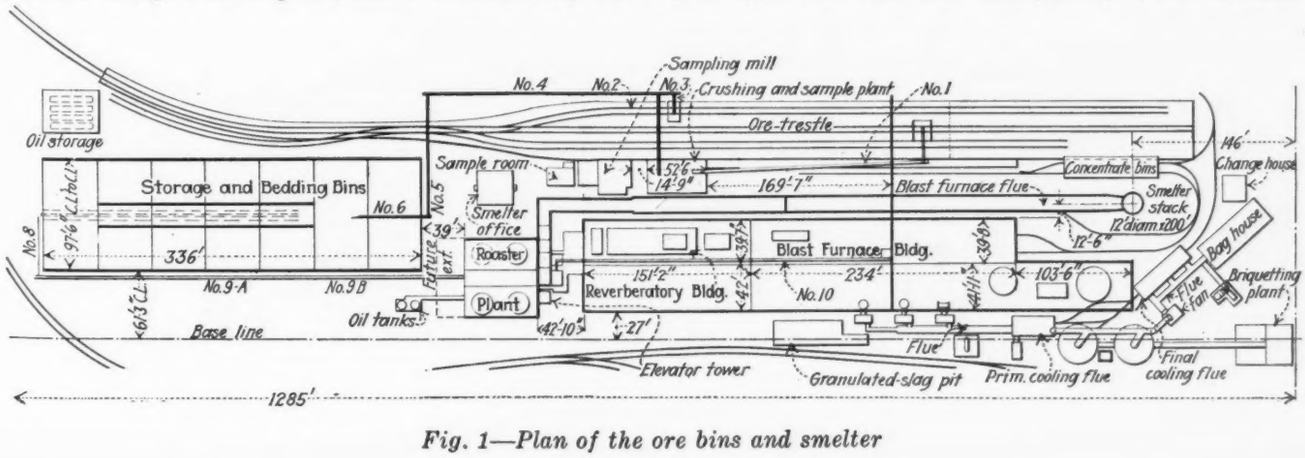
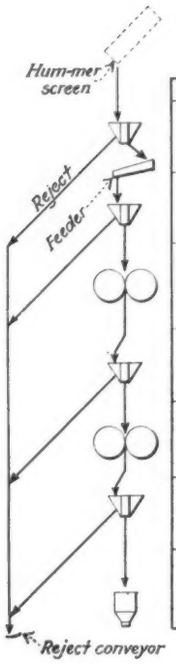


Fig. 1—Plan of the ore bins and smelter



Size Lot, Tons	Operating Schedule for Samplers					
	10-12	13-25	26-50	51-80	81-125	126-200
Vezin Sampler A	20%	20%	20%	20%	20%	20%
Vezin Sampler B	100%	20%	20%	10%	20%	20%
Tons 1 hour 18" x 10" rolls ¼" to ⅛"	10	2	2	1	2	2
Vezin Sampler C	10%	20%	10%	10%	20%	10%
Tons 1 hour 18" x 10" rolls ⅛" to 1/16"	1	0.4	0.2	0.1	0.4	0.2
Vezin Sampler D	100%	100%	100%	100%	20%	20%
Sample Safe Lb.	400 to 480	216 to 400	208 to 400	204 to 320	260 to 400	202 to 320

Fig. 2—Sample flow sheet and distribution

it to the ore-storage and bedding bins. The sampling equipment consists of a system of Vezin samplers and crushing rolls as shown by the flow sheet.

Concentrates are unloaded into a concentrate-receiving hopper, from which they are conveyed by belt conveyors 3, 4, 5, and 6 to the storage and bedding bins. This material is sampled by the pipe method before the cars are dumped.

Storage and Bedding Bins

Owing to the irregularity of shipments and their size, it is necessary to provide storage for a larger tonnage of ore than would be necessary if the ore came to the plant in regular shipments, so as to have, at all times, a sufficient quantity of material in stock to give a uniform tonnage to the plant and a proper charge to the furnace. This storage must be for unmixed ore, as the single shipments are too large to bed as received. The ore receipts run about 12,000 tons per month, and the storage and bedding bins were designed to hold approximately 31,000 tons at 100 lb. per cubic foot, but owing to the material going into the bins being heavier, and piling higher than estimated, the actual capacity of the bins is 40,000 tons.

The building, which is entirely of reinforced concrete and steel, is divided into thirteen storage bins and four bedding bins as shown in Fig. 1. Ores and concentrates are delivered to the storage bins by a 20-in. belt conveyor (No. 6), supported in the roof trusses of the building, which takes the discharge from conveyor No. 5 and, with the aid of a motor-driven tripper having shuttle conveyor discharge, delivers material into the bins where it is desired.

All ores and concentrates are taken from the various storage bins and placed in the bedding bins at the center in the proper proportions for making up the furnace charge. This is done by a 7½-ton Shepard electric traveling crane, 100 ft. span, equipped with a 2-cu.yd. Blaw-Knox No. 625 clamshell bucket. This crane has a bridge speed of 400 to 450 ft. per minute a trolley speed of 150 to 200 ft. per minute, a hoisting speed of 90 to 150 ft. per minute, and a bucket-closing speed of 90 to 150 ft. per minute.

The material is reclaimed from the bedding bins by removing boards from a longitudinal slot in the floor, thus allowing the material to flow onto a 20-in. belt conveyor (No. 7), placed directly under the bedding bins in a concrete tunnel 8 ft. wide by 6 ft. 5 in. high. (See Fig. 3.) Belt conveyors Nos. 8, 9 A, and 9B convey the charge from the bedding bins to the roaster hoppers in the roaster plant, or to the silica bins. The roaster bins are of 100 tons' capacity and the silica bins, 70 tons'.

All belts for the conveying system were furnished by the B. F. Goodrich Rubber Co. and are that company's "Long Life" brand. The conveyor galleries all have steel framework, as shown in the accompanying

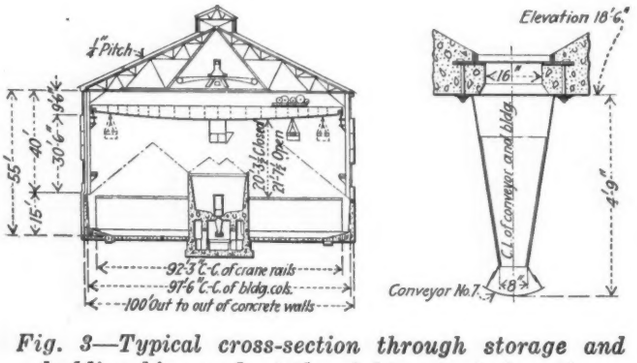


Fig. 3—Typical cross-section through storage and bedding bins, and, at the right, a typical section of the discharge chute

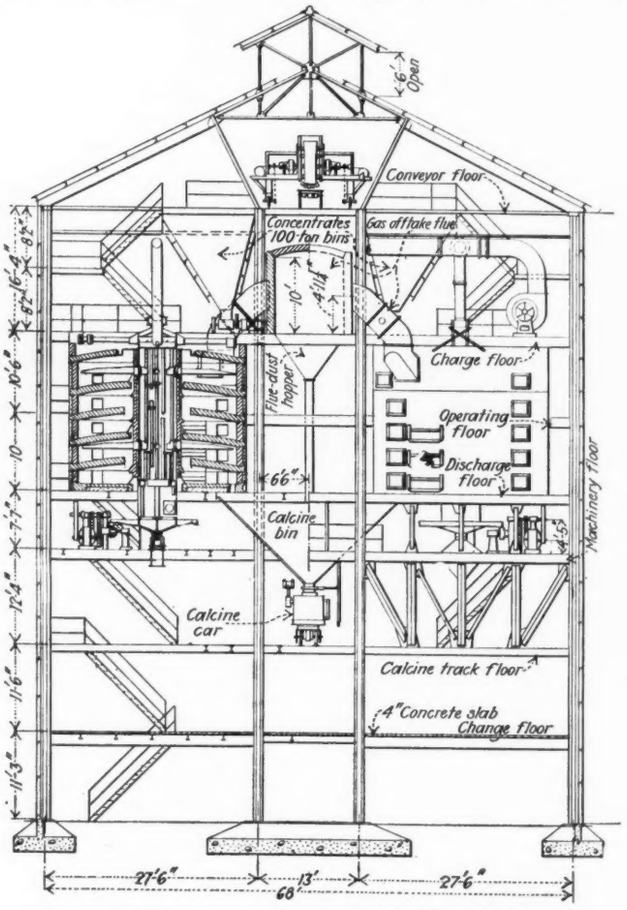


Fig. 4—Half cross-section and half end elevation, Wedge roasting plant

photograph, and wood floors, and are covered with Robertson protected metal. Further details on the conveying system are given in the table in the second column on this page.

Roaster Plant

From the roaster feed bins the charge is fed to the roasters by Stephens-Adamson 24-in. steel apron feeders having a speed of 8.6 ft. per minute. The roaster or drier plant, Fig. 4, is equipped with three Wedge roasters 22 ft. 5 in. in diameter and having five hearths each, with space left in the building for a fourth roaster. The rabble arms of these roasters are air-cooled and of extra heavy construction, so as to handle, without excessive repairs, the maximum tonnage through the roasters, which occurs when only a drying operation is carried on. The plant was built primarily for drying operations, and each drier has a capacity of approximately 300 tons per day, eliminating about 10 per cent moisture. The rabble arms of the roasters have a speed of approximately one revolution per minute and are supplied with cooling air by a Clarage double-inlet fan having a capacity of 9,000 cu.ft. of air per minute with a pressure of 2.9 oz. There are four of these rabble arms to each hearth, so as to equalize the load carried by each arm.

One calcine bin serves two roasters. The walls of these bins are insulated by being built of two steel plates with a one-inch space between them filled with lime mortar. The calcine, or dried ore, is drawn from the calcine bins into a 7½-ton self-propelling electric calcine car, the hopper of which is conical, with a 45-deg. slope. These cars, after being weighed on a 15-ton 24-in. gage railroad scale, are run to the reverberatory furnace.

The flue for handling gases from the roasters into the main flue is 10 ft. 10 in. wide by 10 ft. high, inside measurements. This flue has a steel framework with red brick walls 13 in. thick. The dust hoppers are of ¼-in. steel plate, brick lined, and arranged for discharging the dust directly into the calcine bins through chutes.

Oil is used for fuel on the roasters, the burners being placed at the second hearth from the bottom. The oil is supplied at 100 to 150 lb. pressure by a Quinn combination pumping and heating set, consisting of two 4½x2¾-in. duplex pumps and double heaters. The oil is atomized with steam at 50 lb. pressure.

One of the features of the roasting plant is its closeness to the reverberatory furnace building, there being a distance of only 43 ft. separating these two buildings, and as the haul from the roasters to the reverberatory furnace is so short, there is only a slight loss of heat from the calcines during the transfer. If the charge were made up entirely of fine material, conveying could be done nicely with drag conveyors. The closeness of these buildings would not allow of an incline track from the roasters to the reverberatory furnace, and it was necessary to elevate the roasters so as to have the track from the roasters at the same elevation as the reverberatory feed floor. Advantage was taken of the space underneath the roasters for the erection of a wash and change room, and a floor for material storage.

The roaster building, which is eight floors, or 91 ft. 3 in., high, is equipped with a three-ton Atlantic elevator, electrically operated.

Conveyor No.	Description	Conveyor Belt: Capacity, Tons per Hour	Speed, Feet per Minute	Width, Inches	Horizontal Length Center Line to Center Line End Pulley	Rise	Angle	Ply	Duck, in Ounces	Top Covering, Inches	Trippers Feeders Weighing Machinery	Actual Hp.	Motors, D. C.: Hp.	Volts	Speed	Motor Pulley (Inches)	Motor Base	Frame No.	Type Drive: Location	Kind of Pulley
1	Ore bin to crushing mill	100	200	30	212′ 6″	59′ 7½″	15° 42′	5	28	¼	With 36-in. apron feeder	10.6	25	230	900	8x7½	MB	7½-S	Intermediate	Tandem lagged
2	Crushing and sampling mill to conveyor No. 4	100	215	20	66′ 4″	.....	.....	4	28	¼	.....	1.38	5	230	1,150	5½x5	MB	1-SC	Head	Single bare
3	Concentrate bin to conveyor No. 4	100	15	36	13′ 6″	3′ 6″	15° 6′	6	28	¼	.....	0.51	5	230	1,150	.....	MB	1-SC	Head	Single lagged
4	First incline conveyor to storage and bedding bin	100	226	20	223′ 0″	51′ 2″	16° 35′	5	28	¼	.....	9.7	15	230	850	8x7½	MB	5-S	Head	Single lagged
5	Second incline conveyor to storage and bedding bins	100	220	20	107′ 0″	17′ 0″	9° 12′	4	28	¼	.....	3.95	7½	230	850	8x6½	MB	3-S	Head	Single bare
6	Horizontal conveyor over storage and bedding bins	100	220	20	329′ 0″	.....	.....	4	28	¼	Tripper with cross belt	7.5	10	230	850	8x6½	MB	5-S	Head	Single lagged
7	Reclaiming conveyor under bedding bins	100	220	20	240′ 0″	7′ 5″	13° 40′	4	28	¼	.....	5.84	7½	230	850	8x6½	MB	3-S	Head	Single lagged
8	Incline connecting conveyor from conveyors No. 7 to No. 9A	100	215	20	55′ 8″	12′ 3″	12° 45′	4	28	¼	.....	2.46	5	230	1,150	5½x5	MB	1-SC	Intermediate	Single bare
9A	Incline conveyor from No. 8 conveyor to No. 9B	100	260	20	296′ 0″	78′ 2½″	14° 52′	5	28	¼	Merrick weightometer	14.5	25	230	900	9x7½	MB	7½-S	Intermediate	Tandem lagged
9B	Horizontal conveyor from No. 9A to roaster plant and conveyor No. 10	100	220	20	169′ 0″	.....	.....	4	28	¼	Tripper with cross belt	6.75	10	230	850	8x6½	MB	5-S	Head	Single lagged
10	Horizontal conveyor from No. 9B to blast-furnace bins	100	220	20	306′ 0″	.....	.....	4	28	¼	Tripper with special chute	7.00	10	230	850	8x6½	MB	5-S	Head	Single lagged

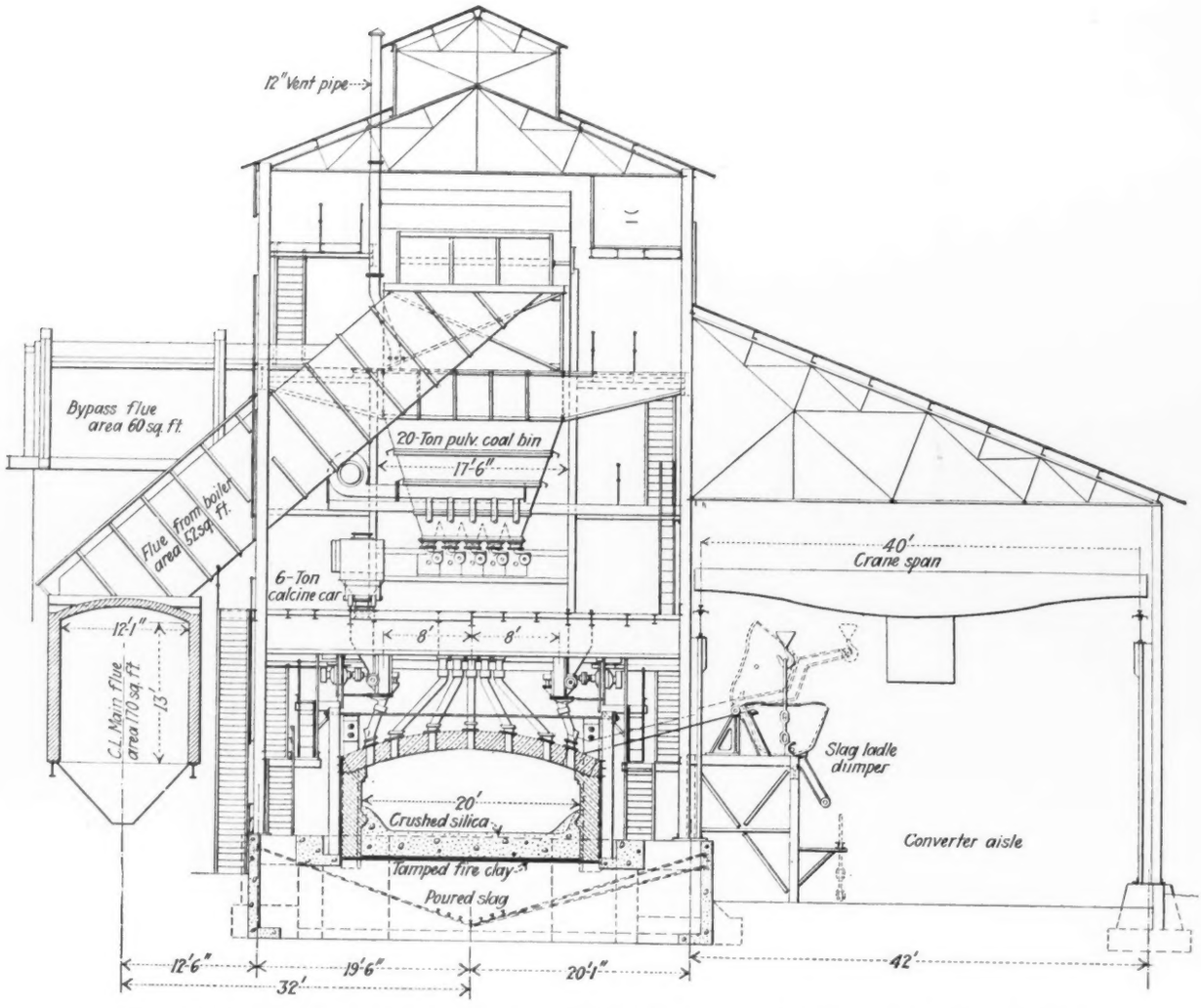


Fig. 5—Cross-section of reverberatory building showing slag-pouring device and flues

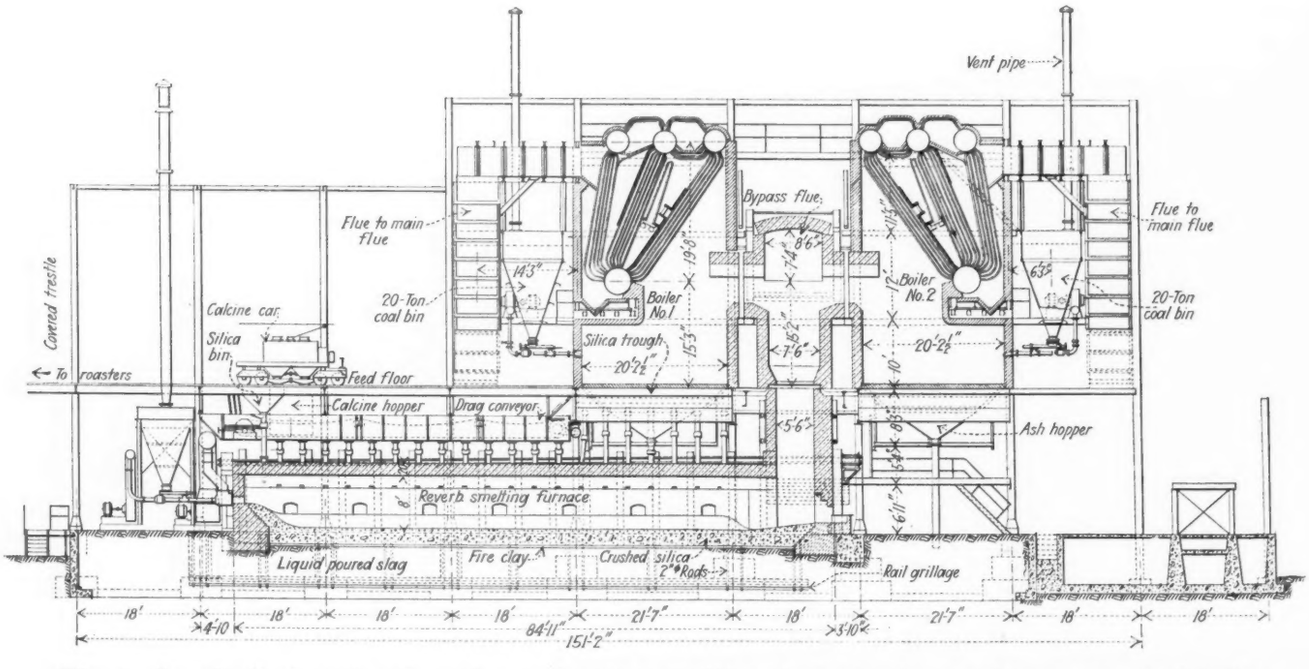


Fig. 6—Longitudinal section through reverberatory smelting plant, showing novel arrangement of boilers

The reverberatory furnace, Figs. 5 and 6, which is equipped with two 779-hp. Stirling waste-heat boilers, is 80 ft. long by 20 ft. wide, inside measurements. The bottom of the furnace consists of a poured slag fill approximately 7 ft. deep, on which has been tamped 4 in. of fire clay and 27 in. of crushed silica. The 24-in. walls are entirely of silica brick except around the matte taps, which are of chrome brick. The arch is built of 20-in. silica brick with a rise of 1⅛ in. to the foot.

Side buckstays are made up of two 12-in. I-beams and are placed on 5-ft. centers with tierods on top 2½ in. in diameter. Buckstays on the firing end are composed of two 20-in. I-beams and are arranged in four sets placed so as to allow for burners. Buckstays on the uptake end are made up of two 15-in. I-beams and arranged in sets of three on either side of the slag tap. The buckstays comprising each set are spaced at 3 ft. 6 in. centers and are held in place on top by two box girders composed of four 5½x5½x½-in. angles each, and are tied up with the buckstays on the firing end of the furnace by 3-in. tierods supported at regular intervals along the length of the furnace.

Reinforced-concrete thrust foundations, strengthened with V-shaped tierods having an angle of 30 deg. and embedded in the poured slag fill, hold all buckstays in place on the bottom. The end blocks are heavily reinforced and backed up by the poured slag fill, avoiding the necessity for long tie-rods at the bottom of the furnace. The side blocks have additional protection against side thrust in the form of concrete ribbons running back to the building wall.

The uptake from this furnace is 12 ft. long by 5 ft. 6 in. wide, inside measurements, and is built entirely of silica brick. The upper part of the uptake is supported by cantilever beams resting on the boiler floor, and its lower portion fits inside of the upper portion, forming a slip expansion joint.

Although the main gas outlets from this flue are to the two waste-heat boilers, a bypass flue has also been provided, with a brick damper, so that in case of trouble in the boilers the gases can be bypassed from the furnace to the main flue while repairs are being made to the boilers. Brick dampers were also provided for the header flues leading to the boilers, but these are now being replaced with water-cooled dampers, so that the draft on the boilers will be independent of the draft on the furnace and the boilers can be fired by auxiliary means without interfering with successful operations of the furnace.

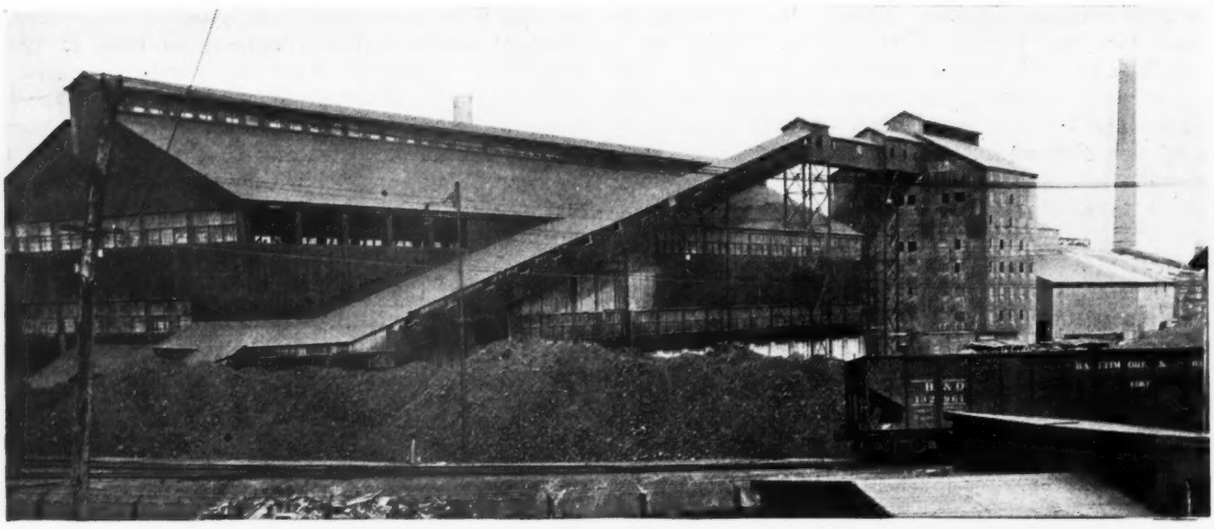
Dried charge coming from the roasters is dropped from the calcine cars into any one of three fettling hoppers, one of which takes care of the five fettling pipes along the bridge wall, and the other two act as feed hoppers to the fettling conveyors. The largest percentage of the tonnage is smelted in the first 40 ft. of the furnace and is conveyed to the various fettling pipes by drag conveyors. On each side of the remaining 40 ft. of the furnace are seven silica fettling pipes, through which highly siliceous ores are fed direct from the calcine cars. All fettling pipes have dust-tight hand-lever-operated valves for controlling the amount of fettling material charged into the furnace.

Inside of reverberatory furnace looking at the firing end

Slag is run in a continuous overflow, granulated with salt water taken from the condenser water system at about 5 lb. pressure, and flumed to a dewatering pit, from which it is removed by a locomotive crane into broad-gage cars and used for fill on the company's property.

When the side walls of the furnace were built and the silica bottom was tamped in, four openings were left for matte tap holes and lined with chrome brick, so as to avoid delays if one or more holes should freeze when the furnace was first tapped. Matte is run from the furnace through a 10-ft. launder into seven-ton cast-steel ladles for the converters.

One other noteworthy feature of this furnace is the arrangement for charging converter slag. On account



South side of smelter extension, showing the ore storage and bedding-bin building, incline conveyor to roaster building, roaster building, and the reverberatory furnace and converter building

of joining the new plant building with the old, the low head-room did not allow for pouring the converter slag directly from the ladle to the furnace. A slag dumper was therefore designed, on which the ladle is set, and by means of an arm extending 5 ft. below the platform of this dumper, the overhead crane is able to tilt this ladle so that the slag runs into a launder leading to the furnace. This arrangement has proved satisfactory, and the spillage of slag is small compared with direct crane handling.

Waste-Heat Boilers

The location of the two boilers, as shown in Fig. 6, is quite a change from standard practice. This was made necessary because of lack of room in joining the new building with the old, and although the new arrangement looked as though it would give better steaming results, the question of equalization of draft could not be determined definitely. It was thought, however, that, under the present method of operating a reverberatory furnace with low draft, this question would not be serious. The results obtained with this arrangement have been highly satisfactory, as will be seen by the evaporation figures shown later, and what at first was thought to be a condition which might give trouble has proved to be an improvement over the old practice.

These boilers, which are equipped with Foster superheaters, Tracey steam purifiers, Copes feed-water regulators, and Diamond soot blowers, are arranged for auxiliary firing with pulverized coal at the same time they are operating on waste heat, when more steam is desired. Boiler feed water is supplied from the central water-treating plant by two 3-in., two-stage Worthington boiler feed pumps operating as boosters and having a capacity each of 230 gal. per minute with

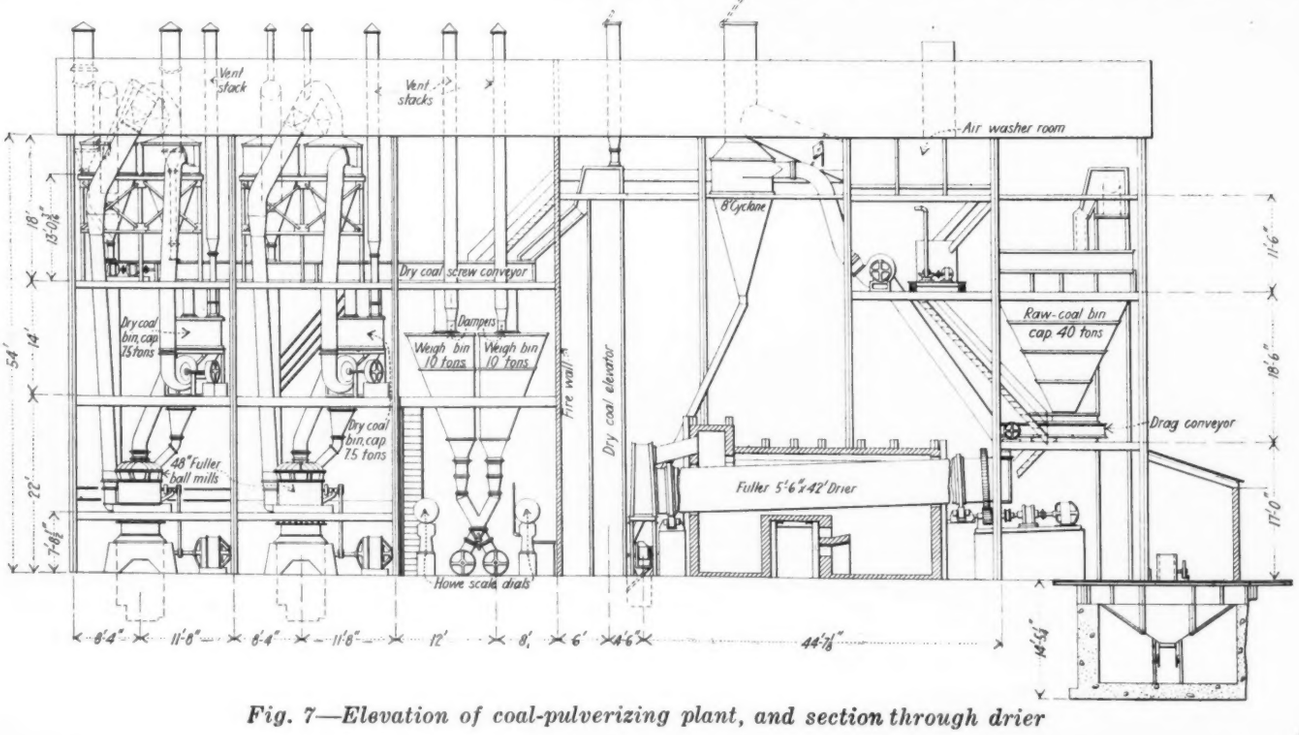


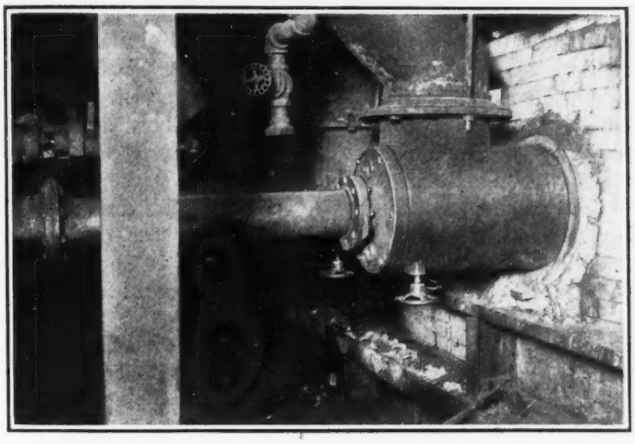
Fig. 7—Elevation of coal-pulverizing plant, and section through drier

230-lb. gage discharge, 180-lb. suction, 115-ft. total discharge head, and an over-all efficiency of 58.5 per cent. One of these pumps is motor-driven, whereas the other one is driven with a Terry steam turbine. Water going to the boilers is measured by a Simplex feed-water meter.

The boilers were built for 275-lb. pressure, with 100-deg. superheat, to conform to future power plant plans, but they are now working at 160-lb. pressure and 100-deg. superheat, which is the normal steam-plant rating. The steam output, which is measured by a General Electric steam flow-meter, is sent through a high-pressure line, designed for 275-lb. pressure, to the main boiler plant, where it is used in combination with other waste-heat and boiler-room steam for general plant purposes.

Very large combustion chambers are provided under the boilers, not only to allow for auxiliary pulverized-coal firing, but also as an aid to dust settlement, so as to eliminate slagging action on the boiler tubes. Hoppers for collecting boiler dust are provided under each waste-heat boiler, with chutes from the bins for discharging the dust. The hopper under the boiler set over the furnace discharges directly into the furnace, the other hopper discharging into a car.

The main part of the converting plant was not

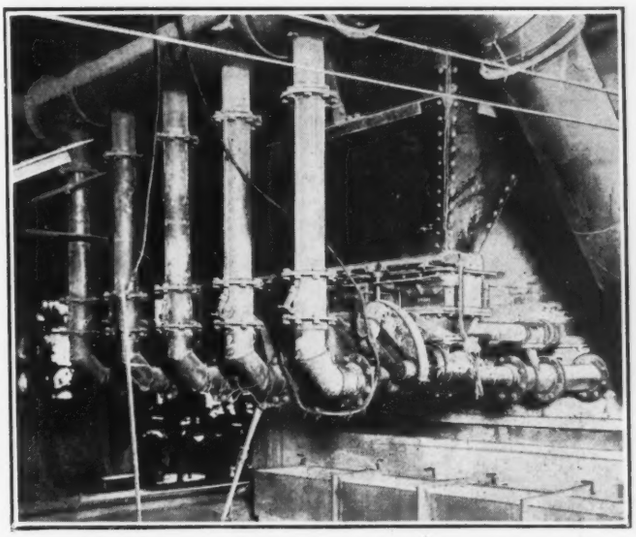


Arrangement of pulverized-coal burners on the reverberatory furnace

changed and consists of three converters, one of which is a 7x10½-ft. Allis-Chalmers that has been in use since the smelter was started in 1907, and two 12-ft. Great Falls type installed in 1921. The two Great Falls type converters are used for blowing matte, and the Allis-Chalmers converter is used for melting scrap brass.

Ladles containing matte from the reverberatory furnace are brought to the converters by either a forty-ton Shaw or a forty-ton Morgan crane, both of which are equipped with auxiliary hoists, and poured direct from the ladles into the converters. The gases from the two large converters are blown into steel flues which lead to the main flue system that handles gases from roasters and reverberatory furnace to the smelter stack. The gases from the small converter are drawn through a series of cooling flues and baghouse and exhausted into the air.

About 30 per cent of the copper from the converters is poured, while hot, into a tilting furnace, where it is oxidized, poled, and then cast into anodes which are sent directly to the tank house. This end of the converting plant has just been completed. The remaining



General arrangement of auxiliary pulverized-coal feeders and burners on waste-heat boilers over reverberatory furnace

70 per cent is cast into pig copper, sampled, and sent to the refinery for casting into anodes and refining.

A Fuller-Lehigh central pulverized-coal plant was erected with sufficient capacity to supply fuel for the reverberatory furnace and two refining furnaces. The use of this type of fuel for copper refining was an innovation, but soon proved an entire success. There is no contamination of the copper due to the coal and very little ash to handle, as most of it remains in suspension. Other advantages are seen in the shorter time required for melting, better fuel ratio, and better control of furnace conditions.

The initial installation included a single-roll crusher, one 66-in. x 42-ft. drier, and two 46-in. mills of the air-swept type, but the capacity of the pulverizing plant is now being increased to provide fuel for eight refining furnaces and two direct-fired boilers as well as the reverberatory furnace. There are now installed two driers and four mills, as already described. Each drier is rated at eighteen tons per hour and the mills are rated at six tons each per hour, pulverizing 85 per cent to pass 200 mesh. The driving motors are connected directly to the mills through flexible couplings. The first two motors installed were 100 hp. each, but 125 hp. motors were used in the last installation.

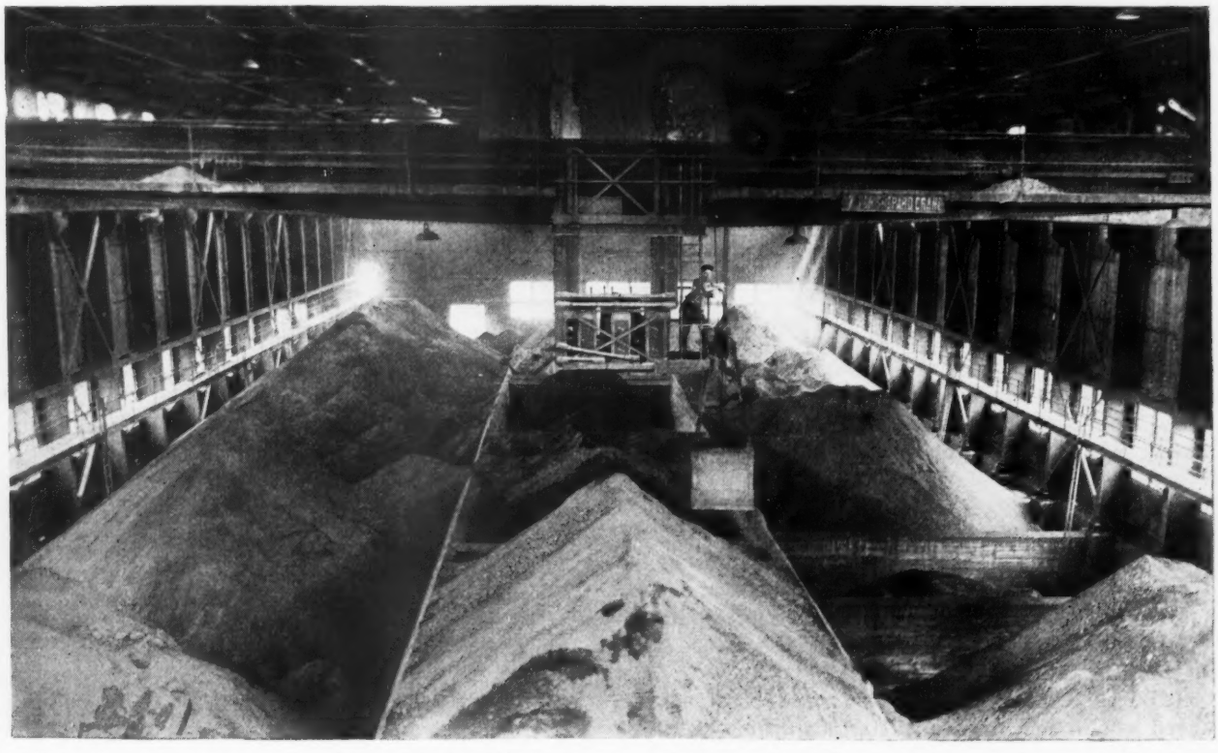
Conveyor and steel framework before closing in. All conveyors used in the new extension are of the same cross-section and design

View of pulverized-coal plant before erection of side wall

The pulverized coal, after being weighed, is conveyed around the plant to the various points of consumption through a 5-in. pipe line. An 8-in. Fuller-Kinyon pump, having a capacity of twenty-five tons per hour, feeds the coal, mixed with compressed air at 40-lb. pressure, into this pipe line. The mixture is about 1 lb. of coal to a cubic foot of free air. The coal is in suspension and is swept along the pipe at a high velocity into steel bins over the furnaces. Here the air escapes from the bins through 18-in. vent stacks passing through the roof. The longest distance conveyed is 1,700 ft., the total length of 5-in. coal pipe being 3,300 ft.

The burning equipment at the reverberatory furnace is directly below fifty-ton storage bins. The coal is fed from these bins by Fuller-Lehigh pulverized-coal feeders to Fitch pulverized-coal burners. Primary air is supplied by a Clarage fan having a capacity of 6,000 cu.ft. per minute, at 4.7 oz., and secondary air is supplied by a Clarage fan having a capacity of 16,750 cu.ft. per minute at 1.1 oz.

Coal is used as the main fuel, but the furnace has been arranged so that if the coal supply for any reason fails oil can be substituted with only a short delay. Oil lines have also been extended around each side



Interior of storage and bedding-bin building, showing about two-thirds of the bins, all practically full of ore and concentrates

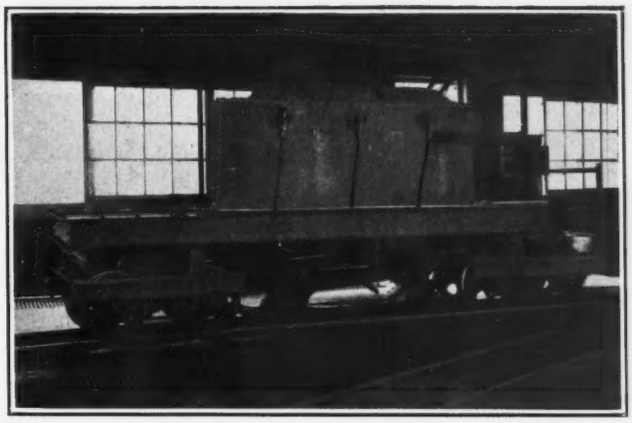
of the furnace, so that burners can be used through the side walls during repairs to the back section of the furnace.

A wood fire was started in the reverberatory furnace on March 12, 1925, with the intention of drying out the furnace for ten days, but owing to certain reasons this drying-out process was continued for a much longer period. On April 17, three oil burners were put in operation and increased to five on April 18. The furnace was credited with waste-heat steam production on April 19. The temperature was held at 1,500 deg. F. just back of the uptake until April 28, when the fires were increased until the temperature at the uptake was 2,200 deg. F. On April 29, four side burners were put through the side doors, two on each side, and the temperature increased to 2,800 to 2,900 deg. F., where it was held until May 2, and the bottom thoroughly fused in. The fire was cut off, and the first charge, consisting of blast-furnace flue dust, which covered the entire bottom to a depth of approximately 16 in., was then charged. After about four hours, fire was again started on three oil burners and two pulverized-coal burners, the three oil burners being replaced with pulverized-coal burners, one at a time. Within four hours the temperature was up to a smelting heat. Continuous overflow of slag started about noon on May 3, and the first matte was tapped at 11:30 p.m. May 4. None of the bottom came up during the starting of the furnace.

The plant has now (at the end of November, 1925) been in operation six months and is working with entire satisfaction. Furnace capacity has not been reached, but the average tonnage is 500 tons per day with dried calcines and the fuel ratio is seven tons of charge per ton of coal. The boilers operate at from 100 to 110 per cent rating, depending on the amount of coal burned. A rating of 100 per cent or better is obtained when burning 72 tons of coal and smelting 500 tons of charge, giving an actual evaporation per pound of wet coal of 6.5 and an equivalent evaporation from and at 212 deg. of 7.8 lb. of water. (These averages are for five months' operation.)

Remodeling of the plant was authorized on April 12, 1924, ground was broken on June 13, and the plant started operating on May 3, 1925. Practically all of the blueprints went to the field from pencil drawings, as the drafting room was just ahead of the field during the construction period. Practically no mistakes crept into the work, for which a great deal of credit is due Ralph W. Kerns, chief draftsman, and H. S. McKnight, construction engineer in charge of all field work and shops. Their co-operation accounted for the successful manner in which the work was handled.

Slag-granulating launder



Calcine car, 7½ tons' capacity

A Hydrometallurgical Process for Lead

A process for the production of lead compounds from ores and from metallurgical and waste products is covered in English patent 240,401, Nov. 11, 1924, issued to the Consortium für Nassmetallurgie, abstracted in *Chemistry and Industry*. Lead ores, slags, and sludges are rendered acid with hydrochloric acid, if necessary, and treated with a strong solution of an alkali or alkaline-earth chloride to obtain a solution of the lead. The solution is purified from iron if necessary by oxidation, and silver and other contents are then precipitated by means of metallic lead. An alkali or alkaline-earth oxide or hydroxide or an alkali carbonate is then added to precipitate a lead oxychloride, a small quantity of lead being preferably left in the mother liquor, which is used again. The oxychloride is suspended in water and treated with the necessary acid to obtain the desired lead salt.

When lead carbonate is required, the suspension is treated with carbon dioxide until chlorine ceases to increase in the solution. When the precipitate is more or less completely separated from the solution, water is added, and carbon dioxide is again introduced, these operations being repeated if desired until the precipitate contains only about 0.5 per cent of chlorine. A small quantity of a base such as lime is then added and carbon dioxide is again introduced, when a further reduction in the chlorine content of the precipitate is effected. The carbonate is usually basic, and may be used as a pigment.

To Build Copper-Leaching Plant in Australia

Mount Elliott, Limited, has engaged a metallurgist to erect the first unit of the Mackay leaching plant to be placed at Cloncurry, Australia, for the treatment of copper ores, according to *Chemical Engineering and Mining Review*. The Mackay process makes use of the fact that ferric chloride has the property of dissolving copper from its oxide, carbonate, and sulphide combinations. Cupric and cuprous chlorides are formed and the ferric chloride is reduced to the ferrous state. Iron may be used for the precipitation of the copper.

France Exploits Aluminum Industry

Production of Metal Expected to Reach 200,000 Tons Annually by 1928—Rapid Development of Bauxite Fields in South Under Way

By Francis Miltoun Mansfield
9 Rue Falguiere, Paris, France

THE historic Provençal capital of Les Baux, in France, owing to the discovery of one Berthier, first gave the name of the red mineral bauxite, which of recent years has become of steadily increasing importance, after having languished for nearly a century. In the years immediately preceding the Great War France was already exporting this valuable mineral. The deposits ran about 60 per cent alumina, with a maximum of 2 per cent silica. America in those years was taking contract shipments of from 30,000 to 50,000 tons. Today, owing to sources of supply nearer at home, America's demands are trifling.

During the war period the British Aluminum Co. worked many of these deposits for allied account. In the years before the war France absorbed 50 per cent of the output, 143,742 metric tons out of a total of 309,294 tons in 1913. The actual production of aluminum metal in France did not, however, exceed 13,500 tons, the limit of French production facilities. The greatest export of mineral in these years was to Germany or to Switzerland for the alimenting of the famous Neuhausen plants. The entire output was from the departments of the Var, the Bouches du Rhone, and the Herault, in Mediterranean France. German plants were even operating, using mineral from fields for which they had the concession from the French Government, in southern France itself.

The parlous times of the war first drew the attention of the authorities to the fact that France was not making the most of her great resources in this material. Immediately after the war France was producing 25,000 tons of the metal, using something like 300,000 tons of the mineral. Meantime, other countries have progressed even more rapidly. The French plants which have made the most remarkable progress are those of the Alais, Froges, and Camargue company and the hydroelectric plants of the High Alps in the valleys of the Arc in the Tarentais, those of Argentière and the valley of the Durance, with other plants in operation in the Pyrenees at Auzat and at Nesta d'Aura.

According to the statements of Monsieur Suhr, a French minerologist of note, world production of aluminum in 1923 was 163,000 tons, but it would appear that he had not taken full note of what was being done in the United States.

In 1928 or 1929 it is estimated that French production of the metal may possibly reach 200,000 metric tons. Present production (mid-year 1925) is on the basis of 50,000 tons per annum. These figures refer to the reduction of the high-content ore with a minimum of silica. Other exploitations of white bauxite, in distinction to the red high-grade ore, are on a fast-developing scale, owing to its rapid absorption for the production of aluminous cement, of which there are at least two French companies operating extensively, with the recorded establishment of an English company, also, which is operating near the mouth of the Rhone and another of the same origin which is just beginning operations in the Department of the Var, near Draguignan, using its own lignite deposits as combustible for generating the electric current required.

French absorption of bauxite of high grade being today approximately 300,000 tons shows that the mining thereof has increased 100 per cent since before the war to supply French needs alone, to say nothing of the continually increased exports to England, Germany, and Rotterdam, which later presupposes that the mineral is also going to Germany. Probably the mine production up to the beginning of the present year is not far from 500,000 metric tons, with the extreme probability that it will annually increase at the rate of 50,000 to 100,000 tons for a long time to come.

It should be remarked that this results from a mere scraping of the surface, practically all deposits being worked under the open sky. Obviously deeper working will soon be necessary. There seems to be no doubt on the part of the French mining engineers and geologists that the supply of the mineral is virtually inexhaustible so far as present needs go and that the deposits run from three to four times the present workings in depth, available the moment the necessity for tapping them becomes apparent. It is thought also, as a result of close investigation of the formations in contiguous territory, that new deposits will be brought to light within the next few years. Supply for a hundred years is believed to be not beyond the bounds of possibility. With new demands for the metal by the electrical industries, no doubt the visible supply will be used up faster than can at present be foreseen, but the fact remains that France has in this highly mineralized bauxite a vast and valuable resource which hitherto has been largely exploited by outsiders and which a wisely conceived mineral policy will try to preserve for the benefit of the country.

Land owners where these deposits lie care little what becomes of the mineral, but economists demand that it be kept at home. The fact that many of the deposits are in small parcels, on land owned by peasant families, the members often being widely dispersed, creates some difficulty in putting all resources into immediate exploitation. Some national law or regulation may come into being to change this, but at present many available deposits are undoubtedly lying fallow. The French mining law provides for the proprietor of the land possessing all rights, even to that of granting concessions, subject to the approval of the government so long as the workings are open cuts, but the moment the deposits are exploited underground the state comes in as part proprietor. A revolution of procedure is looked for as a part of the new economic régime in France.

There has been a live agitation during recent months on the part of chambers of commerce throughout the bauxite region for the safeguarding of these national resources. Interest in the situation is divided into two camps or schools—that which favors France reserving the mineral for her own industries and that which favors the export of the raw material. Capital is made of the fact, by those of the latter school, that the vast iron ore mining industries of Briey and Lorraine in general could not possibly live and make a profit without a liberal export policy. For a time France put an embargo of 20f. a metric ton on all bauxite exported, but this was abolished a few years ago, and today the traffic is free.

Deposits now being worked employ to a large extent foreign labor, chiefly Italians, Poles, Russians and Spaniards. Modern methods are not used or called for, but more efficient equipment will undoubtedly come into use.

Classifying Mining Ventures

How to Distinguish Between Various Kinds of Investment and Speculation in Buying Shares

By George A. Packard
Mining Engineer and Metallurgist, 50 Congress St., Boston

AS A FEVER CONVALESCENT in a hospital in Mexico last year, I made use of the excellent opportunity by ruminating at some length on the following:

1—What a poor "run for his money" the average man gets who tries to invest or speculate in mining.

2—What a failure the mining profession is in rendering assistance to this average man.

A few days before, the manager of a large mine had commented on the large sums an American company was spending near by, with, at best, only a chance of getting its money back. He mentioned better opportunities elsewhere, and remarked how unfortunate it is that the average American investor does not know how to investigate a mining proposition or to determine even roughly what his chances are.

The following classification is submitted as a basis for giving the mining investor some idea of the probabilities. The classes of course merge into one another, and a property which is in one class today will move into another as development or depletion progresses.

I—Mining Industrials. This class comprises companies in which mining is only one of several activities, perhaps the major one; possibly only a minor one. Examples are the Aluminum Company of America, the American Smelting & Refining Co., the National Lead Co., and the New Jersey Zinc Co. Anaconda has entered this class since acquiring American Brass. United States Steel and Standard Oil are other examples, but coal, iron, and oil properties are not considered in this article. These companies own large supplies of the raw material that they use, and replace exhausted holdings with new property, either owned directly or controlled. The fact that a mine is a wasting asset hardly needs consideration in buying their securities; and attention need be given only to the same points which should be considered in the purchase of any industrial stock. The careless purchaser, oblivious of stock market and industrial conditions, who "buys at the top," probably will lose no more than 50 per cent of his investment if forced to "sell at the bottom." And, on the contrary, the wise and calculating investor in this class of mining can hardly hope to do more than double his money, besides earning fair interest, within a period of five year.

II—Mines With Large Proven Reserves. It is important that the estimate of reserves be dependable and not the fake presentment of an unprincipled promotor or the dream of a hopeful prospector. Proven reserves, of course, mean assurance of a reasonable life.

Many of the mining companies listed on the New York Stock Exchange belong in this class. Examples are Chile Copper, Utah Copper, St. Joseph Lead, Texas Gulf Sulphur, and Homestake Gold. These are manufacturing concerns with an assured supply of raw material, that can be exploited at an approximately known cost. Here the probable life of the property begins to enter as a factor in the value of the shares. With Chile Copper, having a probable life of 75 to 100 years, it means merely that 1 per cent of the investment, plus interest, should be returned annually. With Homestake, if the recent suggestion of a ten-year life is accepted, and new property be not acquired, the annual return should approach 10 per cent of the price paid for the stock, plus a fair interest rate.

With this class of mines, the unwise investor, *buying at the height of a boom*, may recover much less than 50 per cent of his investment. This is especially likely to happen near the end of the life of the mine. The market price of the stock may at that time fail to discount the extent of depletion, the remaining reserves may be extracted during a period of low metal prices, and the management may dissipate the earnings in a search for another property. On the other hand, the man who buys with judgment and discretion may in five years do better than double his money, and earn a fair interest. New discoveries may prolong the life of the mine, or higher metal prices may not only increase earnings but make profitable ore that formerly was valueless. Judiciously purchased, shares in Group II offer security almost equal to those in Group I; opportunities for a return of more than double the amount invested are greater, but chances of loss are likewise increased.

III—Mines With Small Proven Reserves. This class covers a wide field, and includes a large proportion of those properties the stocks of which are listed elsewhere than on the New York Stock Exchange, as well as operating properties owned by small unlisted companies and syndicates. It includes such mines as Old Dominion, at Globe, Ariz., which, with no more than four years' ore "in sight" at any time, has continued to produce and to pay dividends at intervals for thirty-five years. Goldfield Consolidated, which paid nearly $30,000,000 in seven years, and closed down, and Carson Hill, which, though it reported $1,000,000 operating profit, has never paid a dividend, are other examples.

Here begins the really speculative stage. Returns from investments in this group are less regular and dependable than with Groups I and II; there are possibilities of greater profit, but there is more chance for loss. Of eleven stocks in this class listed on the New York Exchange in 1919, nine paid dividends during 1919-1924, at an average rate of 5 per cent per annum. Of thirty-four companies in this class whose stock was traded in on the Boston Curb during 1919, twenty-two paid during the same period an average of 8 per cent. Of these thirty-one dividend payers, eight returned in that time more than the amount of capital stock *at par*, and several others more than the amount at which that stock originally was sold for. Several returned 300 per cent in that period. These, however, are companies which have been able to satisfy listing requirements, and the returns are unquestionably far better than the average for this class.

While fluctuations in the price of these stocks may be considerable over a period of years, it is only rarely that they are rapid. But they require watching.

Occasionally the wise and lucky investor gets, within five years, 500 per cent return. Similarly, the unlucky one must take a loss of 50 per cent to 90 per cent. He must indeed be "asleep at the switch" if he loses more, when the stock is listed. The investor in unlisted mines of this class, where the only market for his stock is at private sale, has little chance of selling when the property ceases to pay. Taking mines of this class as a whole, it is doubtful if the investor has more than one chance in ten of getting back his investment with a fair rate of interest. Here the advice of the engineer as to purchase, and especially as to holding on or selling, will often save large losses.

IV—Mines With Practically No Reserves, and Prospects in Process of Development, That Have Some Ore. This class includes the aged and infirm as well as the promising children. Nearly all good mines pass through this stage twice. During the period of decline it may last many years, and good management and skilful exploration may prolong the period of profit, to the great advantage of the investor. Thus the Wolverine mine, in the Lake Superior country, now defunct, produced for several years after exploration ceased. On the other hand, Ahumada Lead, which in 1919 sold at $1 a share, was probably at that time in this class. It paid 90c. in dividends in 1925 and is selling around $9 per share, an increase of 900 per cent.

Examples of prospects which already show commercial ore are common. We see them in Butte, Jerome, Tintic, and the Coeur d'Alenes. Among mines of this class dividend payers are few. Old ones soon die; successful new ones move into Group III, though the great majority of the new ones fail to return the capital invested, plus a fair rate of interest. Of 150 mining stocks traded in on the Boston Curb in 1919, probably thirty-five may be considered as in this class, of which ten have paid dividends at some time. In this class a new condition is encountered: the investor may lose everything, whether he buys stock or takes a share in a development syndicate. To determine what proportion of mines and mining stocks purchased at this stage ultimately will return the investment, with interest, would require much investigation. It can hardly be more than 1 in 25. It may be as low as 1 in 100. But among the winners an ultimate annual dividend of 20 per cent to 100 per cent on the amount invested at this stage is not uncommon.

V—Prospects With Practically No Ore. These are the babies. The promotor calls them "mines." And some of them have many thousand feet of tunnels, shafts, and drifts. Often thousands of dollars have been expended on them. Often they show a little ore and high assays may be obtained. In this class are found the majority of the companies listed during boom times on the minor exchanges, the stocks sold by the irresponsible brokerage houses, "fiscal agents," and "financial engineers." Here, too, is the property in which Bill Jones, of Nevada, offers an interest to an acquaintance made on the train or to the old friend of his boyhood.

Robert E. Tally is quoted as saying that only "one profitable mine is developed from 22,000 locations." When allowance is made for the fact that for every promising location four more are made for protection, and others for dumps, mill sites, and water rights, the ratio could hardly be better than one profitable property in 2,000. The man who invests at this stage probably has a better chance than this, because the property may so improve in appearance that he can sell his holdings at a profit. But it is doubtful if one in 200 gets his money back with interest. Truly a long shot! Widows and school teachers and ministers should be made to realize this.

Yet the prospect is not to be unceremoniously damned. As every sane child is a potential president, so every healthy prospect is a potential mine. And for the investor who is fortunate enough to be a winner, the *profits* are often tremendous. United Verde Extension is, of course, the famous example. One hundred dollars invested during the prospect stage, when the stock sold at 30c. a share, would have returned $20,000 in ten years. The same amount put into Tintic Standard in 1916 would now be worth, with dividends paid, over $90,000. Even Bingham Mines, repaying $2,400 for $100 in twenty-two years, gave an excellent return.

VI—The Hopeless Proposition. Hopeless today, at least! Gold from sea water, a gold mine in the slates underlying New York City, narrow veins of lead ore 200 miles from a railroad, fake propositions put out by crooks! Properties of this class are far from being uncommon. To the experienced engineer their hopelessness is obvious, but to the average investor it is not apparent.

It has been shown that the chances of loss may vary from almost none in the case of the wise investor in securities of Group I, to 100 per cent in Group VI. Few investors, however, have any conception of this tremendous variation. If the engineer, in his conversation, occasionally will refer to these conditions, the average man may find himself in a position to determine roughly what his chances are. If he knows he has only one chance in 200 of getting his money back, but is willing to take it because he may get two hundred for one, he will not be disgruntled if he loses. The important thing is for him to understand what he is doing. Engineers should broadcast this information in the hope of decreasing waste and grief. Let the public know that there are not only good and bad mining investments, but also legitimate "long shots." Eventually it will redound to the benefit of the profession, for every investor who studies the problem will soon learn that the experienced engineer can at least decrease his losses and increase his chances by giving proper weight to the numerous factors to be considered.

Color-blindness

"Tisn't surprisin' that most o' tha minin' companies be goin' h'in for this 'ere h'examin' o' their h'employees, for to do minin' properly a chap mus' be soun', 'ale, an 'earty, an' 'ave 'is wits 'baout 'im. T'ain't h'only that 'ee mus' 'ave a 'eap o' brawn, but 'ee mus' do some thinkin' for 'imself an' use 'is h'eyes right, providin' they be such h'as they can be o' use to 'ee. By that I mean that 'ee mus' naw black from w'ite, an' red from blue, an' so h'on. An' 'ee should naw somethin' 'baout tha meanin' o' color. For h'it be mighty perilous, naow an' again, w'en somethin' 'appens like I came 'cross this mornin'. Commin' 'long tha road to tha bal I see a chap carrin' a red lantern, an' sez I to 'ee, 'Billy, w'ere be thee goin' with the red lamp?' 'Oh,' sez 'ee, 'I jus' picked un h'up. Some bloody fool left un by a 'ole in tha road.' "

Discussion

"Engineering and Mining Journal-Press" is not responsible for statements or opinions published under "Discussion." In many cases the views expressed are diametrically opposed to editorial policy and belief. Letters will not be printed unless the author's name and address are known to the editor.

Occurrence of Commercial Zinc and Lead Orebodies in the Tri-State District

THE EDITOR:

Sir—In the Missouri-Oklahoma-Kansas lead- and zinc-mining district, the mining of the zinc and lead sulphide orebodies has had a general progressive movement from the east to the west, and, as it has happened, this movement has been accompanied by progressively richer and larger orebodies, which has also fitted in with increasing demands for the mine products.

In the eastern district, of which Aurora is a type, the commercial orebodies were in the limestones beneath the Boone, occurring as elongated deposits filling vertical fractures. These are probably uneroded remnants, as the same type of occurrence appears at various places in the Joplin and Waco areas, under the main mining horizons, and is probably very common, but has been little exploited. Available information indicates that these bodies, as mined, probably gave a 3 to 4 per cent yield of concentrates.

The Webb City-Joplin-Galena district upper ground was characterized by individually small orebodies, partly oxidized and partly eroded by mechanical or solution forces. On a broad basis, though some were very rich, the average yield was probably not over 4 per cent. The sheet ground had fundamentally different characteristics from these mines and from those now making important production, and are not here considered.

The western part of this district gave an average of larger individual orebodies and of somewhat greater average richness than for those mines in the eastern part. The Galena-Neck City and Alba camps approached the characteristics of the Waco-Baxter Springs districts, with large individual orebodies and a broad average yield of 5 to 5½ per cent. It will be noted that this last group is on the border of the great area of uneroded Pennsylvanian shale.

The next step to the west brings the present great producing district from Miami, Okla., through Picher and north into Kansas. This district is characterized by numerous large individual orebodies with an average yield of 6 to 7 per cent in concentrates. These bodies underlie what is practically a solid blanket of Pennsylvanian shales and are broadly marked in their westward extension so far as now known by the long northeast-southwest solution fracture called the Miami fault.

It is very evident that prior to the laying down of the Pennsylvanian shales there was a long period of exposed land surface in which the topographic features were largely developed by underground solution, producing sink holes and underground water-courses of the irregular ramifying type characteristic of such solution channels and feeders. This irregular surface was covered and the depressions were filled by the muds of the Pennsylvanian shales, when deposited, which running down into the underlying caverns became mixed with any existing débris and formed stratified beds where openings of sufficient size permitted. It is also evident that the main sulphide mineralization came at a later date and that in connection with it there was a continuance of underground solution and replacement of limestone by silica and ore materials, causing slumping of the Boone formation affected, as well as the overlying formations, particularly the shale.

This feature is well brought out by the various reports on the district, but the literature does not seem to give a satisfactory explanation of a fundamental feature connected with all the important orebodies—that is silicification.

This is not an attempt at a theory, but a statement of certain broad facts apparent to any one familiar with the district, and certain deductions, therefore, seem logical.

It is evident that there are three general types of occurrence of silica in large amounts. The first is the chert layers in the Boone formation, showing every reasonable evidence of having been formed and deposited contemporaneously and interlayered with adjacent limestone beds. The second is the great areas of what is apparently the same chert, varying in mass percentage from about the normal chert layer percentage in the Boone to a 100 per cent mass of chert. This is clearly a great silicification by the same character of material as the original Boone chert. All the important orebodies are in such (chert) silicified masses, which attain great dimensions, almost measurable by square miles. Throughout such masses there are irregular areas of unsilicified Boone, known in the district as "lime bars," and the limits of the commercially mineralized district are marked by large areas of such lime bars or unsilicified Boone.

The third type of silica is the jasperoid, often associated directly with the ores and with the appearance of having at one time been in the silica-gel form.

The second type or chert silicification is the important factor so far as commercial orebodies are concerned. It is of the same physical and presumably chemical character as the original Boone chert, and surficial observation indicates that this is a very readily soluble and presumably mobile form of silica. As pointed out by Buehler, surface fragments of this chert are characteristically pitted and porous, and light in weight, indicating solution and migration of a larger percentage of each piece.

It would seem that the logical source of the tremendous masses of silicifying chert in the mining areas must have been migration from the weathered and dissolving chert of the same type in the areas to the east. Solutions capable of carrying silica in such

masses were capable of carrying adequate lead and zinc compounds to supply the present orebodies, but the formation of such commercial orebodies was probably a subsequent stage.

In drilling conducted near the mines, large areas of chert are frequently found, known as hog chaw. This is a chalky porous chert full of minute fractures and evidently leached. The leaching of silicifying chert carrying appreciable quantities of lead and zinc could readily supply both the lead and zinc and the jasperoid silica, forming under favorable conditions the workable orebodies. These bodies are commonly banked against the contact between the silicified and (lime bars) unsilicified masses of Boone formation, where fracturing would naturally be likely to occur, as the one phase is brittle and the other fairly tough and elastic.

It is very difficult to account for these tremendous silicified masses by deposition from artesian waters arising from pre-Boone formations, and, in fact, they are lacking, as well as commercial lead and zinc orebodies, in certain areas particularly favorable for such artesian circulation.

The striking feature of these generalized observations is the gradual change from east to west of magnitude and richness of orebodies, which can reasonably be accounted for by the factors of time and opportunity —that is, the varying periods of Pennsylvanian shale covering and a westward migration of mineralizing materials.

E. E. ELLIS.

New York, N. Y.

Americans vs. Mexicans in Arizona

THE EDITOR:

Sir—Rather recently I read an article published in the *Mining Journal-Press* a little over a year ago, written by Mr. Parsons on the subject of mine labor and why we do not attract more young men away from the white-collar jobs. Allow me to make a few observations.

At the United Verde Copper Co. plant there is usually a crowd of seventy-five to a hundred looking for work. There are five or six Mexicans to one American. The Americans wait a week or two and frequently longer and see many Mexicans hired before their turn comes. Probably the Mexican waits longer than his American brother, but why should any Mexican be hired as a mucker when there is a more capable American looking for the same job? Would not a Mexican in Mexico resent having to await a job longer than an American? This is the first place where Americans decide to look for work elsewhere. "But," you say, "The American will not muck." Hold on! I said these Americans were looking for work as muckers.

Now let us see what happens after the American gets his job. Frequently he mucks two weeks or longer, but generally he becomes a chuck tender or timber helper the first week. He holds this job for two months or so and then begins to wonder when he is going to get a better job. He sees Mexicans given plugger machines and Leyners and also sees Mexicans become timbermen. Oh, yes, these Mexicans have waited longer than he has, but what of that? Two months from now or much sooner would he not be a better miner or timberman than the Mexican who has waited longer for the job? Watch an American grab at a chance even for a plugger. As he keeps on waiting he wonders if he could not do better somewhere else. Frequently he decides he could, and the mining industry has lost another white man probably never to return. Any white-collar job looks better than one as a Mexican's assistant.

Yet our superintendents wonder why the Americans don't stick. Give them a chance, brother. It would not be far from the truth to say that a second-rate American miner is better than the average first-rate Mexican. Let the bosses and superintendents give the Americans their desired promotion and watch them stick. The blame is on you, you superintendents, you foremen, you shift bosses.

I am speaking for the average young American.

This letter is written by a Phi Beta who thought he could beat a Mexican out of a job.

Jerome, Ariz. ROBERT B. DICKSON.

"Logging the Ship"

THE EDITOR:

Sir—In this age of card cabinets and loose-leaf ledgers, I am not quite certain that the "logging" method of keeping records of enterprises is not to some extent practiced. In the keeping of accounts, the process is opposite to that of ordinary accounting in that all accounts are carried back to the day they were opened, and thus kept together, instead of being carried forward to the day of closing.

In "logging" a mine everything connected with a day's operations would be entered together as the day's record. Although the cycle of operations may cover weeks, months, or years, it is possible to describe them later with correct dates and references to this day, each day's record being thus fully completed and complications simplified. A prospect becoming a mine resembles a ship, with a cargo of ore, starting upon a voyage to the distant port Success. Why not log each day in a similar manner? A mine's log should be as interesting and valuable for reference as the log of a ship is considered.

We will consider an important day in the log of a hypothetical mine, the "Columbia." The accounts are assumed to be kept on the ordinary forms, to be fully completed at a later date as the data become available. In the contracting of obligations Dr. and Cr. proper space is left beneath each entry for the date and memoranda as to its discharge:

Log of Columbia Mining Co.

Dec. 21, 1926

Operating Record
- Ore extracted
- Assay values
- Freight
- Smelter returns, etc.

Foreman's report
- Salaries
- Wages
- No. miners. . . . No. muckers . . . , etc.
- Reports on machines and ground

Mine Accounts

	Cr.	Dr.
Groceries from H. & B. Co.	.....	$58.60
Dec. 28, 1927, Bill H. & B. Co.	$58.60	.....
Bill and Jack paid off	96.00	.....
Ophir prospect, loan	$2,000	.....
Ophir prospect, loan Feb. 8, 1927	2,000	.....
Ophir prospect paid loan Dec. 21, 1927	....	$4,000

Separate log for Ophir mine dating from Dec. 21, 1926, started today

Memorandum

Annual meeting of stockholders held today; all officers retained.

For and in consideration of buying the Ophir prospect in one year from date for $20,000 cash and $20,000 in company stock at par value, making approximately $50,000, at its option, the Columbia Mining Co. loaned the Ophir prospect $2,000 to be used in development under supervision. If improvement warrants, $2,000 more may be loaned at the option of the president of this company.

Feb. 8, 1927, the company loaned the Ophir prospect $2,000 more. They expect to ship a car of ore in the near future.

March 3. The Ophir Company billed a carload of ore to the smelter.

April 10, 1927. The Ophir Company smelter returns show a profit of approximately $7 after deducting wages, and reasonable expenses of extraction. They consider themselves safe and are starting two shifts, one to drift and one to sink further.

Dec. 21, 1927. At stockholders' meeting 40,000 shares of new stock was issued to take over and assist in financing the Ophir mine.

It is obvious that the general history of the Ophir mine would be kept here and the details in its own log. E. V. A.

Jerome, Ariz.

A Generous Correction

THE EDITOR:

Sir—In your issue of *Mining Journal-Press* of Oct. 17, 1925, there is an article by T. A. Rickard entitled "A Journey to South Africa—IV." The author states that I have been responsible for the design of the West Springs reduction plant, a statement which is not only incorrect but is also most unfair to the gentlemen who were responsible for the design—namely, Messrs. Carl Davis, J. L. Willey, and S. E. T. Ewing. I am not employed by the house which exercises the financial and technical guidance of West Springs.

I had the pleasure of Mr. Rickard's company in a small social way during his visit to Johannesburg, and while our conversation easily drifted to professional subjects I am certain that no special claim was made by me to the design of any local reduction plant. I ask you, therefore, to rescue me from the false position into which our friend Mr. Rickard has placed me and do me the justice of a correction in your journal at the first opportunity. F. WARTENWEILER.

Johannesburg, South Africa.

Topographic Maps

THE EDITOR:

Sir—Niggardliness is not economy, nor is it New England thrift. It is but miserly stinginess, unprogressive, sordid parsimony. All of which is directed at the budget maker and whoever else may be partisan or participant in the attempt to reduce the Congressional allowance for topographic maps. Such a move cannot in any manner be classed as economical. It is plain niggardliness.

Never was I more pleased than with the editorial in the Jan. 2 issue of the *Mining Journal-Press*. Nothing geological could be of greater general importance than topographic maps. They are of inestimable educational value. As a director in a suburban school several years ago I introduced them into several rooms where they were of practical use. They should be in every school room in the United States above the fourth grade. JESSE A. ZOOK.

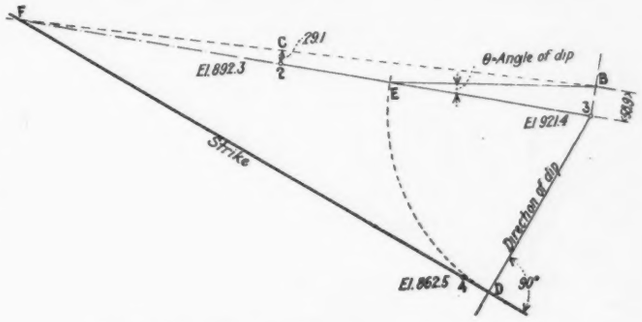
Joplin, Mo.

Determining Dip and Strike Graphically

THE EDITOR:

Sir—I herewith submit a graphical solution of the "dip and strike" problem which I consider to be much simpler and more truly graphical than the one suggested by Mr. Kemnitzer in the Dec. 26 issue of the *Mining Journal-Press*. My solution requires no calculations whatever.

Referring to the accompanying diagram:



Dip and strike problem graphically solved

1. Plat points 2-3-4 in their relative positions as ascertained by survey.

2. Through the highest point (point 3 in Kemnitzer's problem) draw a line 3-*B* perpendicular to the line connecting the highest (point 3) with the next highest (point 2). On this line lay off 3-*B* = 921.4 — 862.5 = 58.9 ft.

3. Through point 2 draw line 2-*C* perpendicular to 3-2, and on it lay off the distance 921.4 — 892.3 = 29.1 ft.

Connect points *B* and *C* by a line that intersects the projected line 3-2 at *F*.

Line 4-*F* is the strike. Line 3-*D* is the direction of dip. Angle *B*-*E*-3 is the angle of the dip (θ).

Butte, Mont. THEODORE SIMONS.

Rapid Analysis of Bauxite

THE EDITOR:

Sir—In the Sept. 25, 1925, issue of your valued magazine, Vol. 120, No. 13, page 502, you give, under the heading "Consultation," among other matters, an important hint regarding a rapid analysis of bauxite. Such a method, if accurate, would be of great value for a laboratory which has to carry out many analyses of bauxite. For that reason I translated the item for the laboratory head of the United Aluminum Works in this place, and we then, in many hundreds of tests, unfortunately observed that the statement that if the ignition loss of the air-dry substance comes to less than 25 per cent the bauxite presumably contains too much silica, is not accurate. On the contrary, with the analysis of the material before us, it was rather impossible to prove a constant relation between this ignition loss and the silica content; most of the bauxite samples showed a loss on ignition fluctuating between 10 and 18 per cent, but were sufficiently low in silica so that the respective bauxites are or were used for the manufacture of aluminum. I take the liberty of pointing this out to you, assuming that you will also be interested in these "negative" findings.

Lausitz, Germany. RUDOLF UNSÖLD,
Lauta Werk.

Consultation

A Substitute for Monel Metal

"What are the possibilities of introducing a substitute for Monel metal? Do you think that there is a ready market for a metal of that kind?

"I would appreciate very much if you would advise me as to where Monel metal originated from. I have been told that Canada has the only output of Monel metal."

The introduction of Monel metal by the International Nickel Co. some years ago has proved very successful and constantly increasing uses are found for this alloy. A substitute, if of the same approximate composition, would no doubt be equally valuable, although the company mentioned has done a large amount of research work and has found it advisable to build its own plant for turning out the metal in semi-manufactured form, as many difficulties had to be surmounted. A new producer would have to use some name other than Monel metal, would have to introduce his product, and see that it reached the manufacturer in the proper form. It might be mentioned that the American Nickel Corporation, of Clearfield, Pa., is reported to have put a similar alloy on the market, made synthetically by alloying copper with nickel.

Monel metal comes from the Sudbury district of Ontario, Canada. The ores that occur there are a mixture of copper, nickel, and iron sulphides which are smelted to remove the iron and sulphur, leaving the copper and nickel in metallic form. This "natural" alloy is known as Monel metal, after the president of the International Nickel Company, who had considerable to do with its introduction. If metallic nickel is desired, the copper and nickel have to be separated, a step in the process which does not have to be done in the production of Monel metal. Canada is by far the largest producer of nickel and the only producer of Monel metal, although a similar alloy could be made up synthetically from a mixture of its components.

The International Nickel Co., 67 Wall St., New York City, has issued many bulletins on Monel metal which give a large amount of information concerning it.

When Is a Stock Ex Dividend?

"Recently I have had the experience of buying shares with which I thought I was getting the current dividend, but which I found to be already ex dividend. Can you explain the procedure?"

Some time ago an explanation of the practice of the New York Stock Exchange in this connection was published by the *Wall Street Journal* as follows:

"A corporation, in declaring a dividend, announces that the dividend will be payable to holders of record on a certain date. Anybody whose name is on the books of the corporation as an owner of stock on that date is entitled to the dividend. This would be perfectly simple if every holder carried in person the stock purchased to the office of the issuing company and got a new certificate in his own name before the close of business on the day named as the record day.

"In practice, complications occur. If you buy stock on Monday on the Stock Exchange, the seller does not, under the rule of the Exchange, deliver the stock to you (or your broker) until 2:10 p.m. on Tuesday, the following day, and you do not pay for it until it is delivered. Conversely, if you sell stock, 'regular way' on Monday, you are not called on for delivery until Tuesday, and you do not get paid until Tuesday.

"From this it follows that if you buy 'regular way' on Monday, the day of record, the stock remains in the name of the seller until Tuesday, and he gets the dividend. You do not become holder of record until Tuesday, hence you buy it on Monday ex dividend. If you are the seller on Monday, the stock remains in your name until Tuesday. You get the ex-dividend price for the stock, and you also get the dividend.

"On Saturday, no delivery of, or payment for, stock is made 'regular way' under Stock Exchange rules, for the stocks bought and sold on Friday, the delivery being postponed until Monday, because of the two-hour session on the Exchange on Saturday. Therefore, if a dividend is due to a holder of record on Saturday, the purchaser on Friday will not become of record until Monday and the seller will remain on record until Monday; so when a dividend is due on Saturday, the stock becomes ex dividend 'regular way' on the Stock Exchange on Friday, instead of Saturday.

"We have used the words 'regular way' to indicate the ordinary procedure on the Stock Exchange. If on any particular day you want to sell a stock so that delivery will coincide with record date, and the buyer will get the dividend, you sell 'for cash,' which means that you make immediate delivery and receive the payment on the day of sale, instead of waiting for the regular procedure. Hence, if a stock is ex dividend, 'regular way,' on Monday, you can make it carry the dividend Monday by selling 'for cash,' in which case the buyer pays you the value of the dividend in addition to the quoted ex-dividend price, and immediately, on that day, has the stock transferred to his name.

"If you want to buy the dividend, you bid for the stock 'for cash,' and the seller adds the value of the dividend to the quoted regular price, because he gives up the value of the dividend to you in the extra price."

Market for Chemical-Grade Manganese Ore

"Can you give me the names and addresses of possible buyers of manganese ore of chemical grade?"

The principal users of the chemical grade manganese ore are the dry-battery manufacturers, whose requirements have naturally expanded a great deal since radio became popular. The principal manufacturers are the following:

Bright Star Battery Co., New York, N. Y.; Burgess Battery Co., Madison, Wis.; French Battery & Carbon Co., Madison, Wis.; Manhattan Electric Supply Co., 17 Park Place, New York, N. Y.; National Carbon Co., Long Island City, N. Y.

Other manufacturers situated in the Middle West are:

Badger Gas & Gasoline Engine Co., Kansas City, Kan.; Wesco Supply Co., 7th and Clark Ave., St. Louis, Mo.; Delta Electric Co., Marion, Ind.; Gee Electric Co., Wheeling, W. Va.

News of the Week

The Mining News of ENGINEERING AND MINING JOURNAL-PRESS is obtained exclusively from its own staff and correspondents, both in the United States and in foreign fields. If, under exceptional conditions, material emanating from other sources is published, due acknowledgment and credit will be accorded.

Summary

UTAH, with disbursements totaling $12,500,000 paid during 1925, leads the Western mining states in dividends paid. Holds first place in silver production, second in lead, and third in copper.

Announcement that Anaconda will equip three shafts at Butte to mine to 5,000 ft., indicates long expected life for the copper mines.

The United States Tariff Commission will undertake to investigate duty of fluorspar; producers want $7.50 per ton.

Noranda Mines, Ltd., has reached an agreement with the Quebec Government whereby the penalty tax on exported copper will be waived.

Flotation, according to a recent report, is now being used in fifty concentrators in the Tri-State zinc district.

Merging of the North Butte and Tuolumne properties, in Butte, should solve the question of the existence of commercial ore east of the Continental fault.

Rich ore is being opened on the 1,200 level of the White Caps mine, at Manhattan, Nev., according to reports.

Several new open-pit mining projects will be undertaken next season on the Marquette iron range, in Michigan.

Modified mining methods in the Quincy mine, in the Michigan copper district, are cutting the cost of ore extraction.

Henry Ford is studying the possibilities of airplane transportation to new mining districts in northern Ontario.

Fifty Mills Use Flotation in Tri-State Zinc District

Bureau of Mines Sees Possible Saving of $5,000,000—Tailing Should Be 2 per Cent, Not 3.5

With the object of improving present milling practice in the Missouri-Kansas-Oklahoma zinc district, the U. S. Bureau of Mines is continuing, at its Mississippi Valley station, at Rolla, Mo., the investigation of milling conditions in that district. Milling practices in vogue in this district are gravity concentration by jigs and tables, and flotation. Efforts have been directed to a study of fundamental milling principles and of improvements in the operation of the concentrating devices already in use. The two main sources of blende loss in the Tri-State mills are in the "chats" and the slime. Investigation of these losses has consisted of two phases: the isolation of the "chats" and of the slime, and the treatment of each after its isolation. Progress has been made in isolating the "chat" and in its subsequent treatment. Thorough desliming and flotation are solving the slime problem.

Some of the ideas resulting from these studies have been put into practice in a number of mills. Lower-grade tailings and reduced milling costs have resulted. Average mill tailing from a Tri-State ore should not contain more than 2 per cent blende, whereas the average in the past has been nearly 3.5 per cent. On the basis of the total production of the district, the loss of 1 per cent blende is equivalent to a loss of $5,000,000 annually. Since the beginning of this investigation, flotation, with filtering or drying of the concentrate, has been urged. Within the last year flotation has made a tremendous advance, and fifty mills in the district are now employing flotation. Differential flotation of galena and blende has been definitely established, and has promoted the introduction of filters; there are now about twenty-five filters in the district. Much interest in better milling has been aroused, and there seems to be an earnest effort on the part of the operators to improve recovery.

Homestake Gold Miners Get Reward for Careful Work

FOR the third consecutive year employees of the Homestake Mining Co. at Lead, S. D., who worked 300 or more shifts underground without having lost any time because of injury are again receiving a $10 gold piece. This is given by the company as a token of appreciation for the careful manner in which they have performed their work. Of the 750 men employed underground, 271 lost no time on account of injury and seventy-eight have been rewarded for three consecutive years, having worked 900 shifts without injury.

Climax Mills 430 Tons of Molybdenum Ore Daily

The American Metals Co.'s mill at Climax, in the Leadville, Colo., district is handling 430 tons of molybdenum ore daily. Its payroll amounts to more than $20,000 monthly.

Bureau of Mines May Keep Track of Foreign Prospects

Would Supply Information to Eliminate Repeated Examinations—Search Now Is Desultory

In considering plans for the work of the new economic branch of the U. S. Bureau of Mines, thought is being given the possibility of establishing a clearing house for information regarding the status and production of foreign mines and mineral deposits.

Rapidly expanding consumption of metals has caused some concern as to future supplies. As a result, an unusual amount of activity is in progress in connection with the search for new sources of various metals. This search, however, is being conducted in a desultory fashion. There is little available information of what has been done in the past. A property that long since may have been shown to be of little worth is examined again and again, with the same result. Had the outcome of the first examination been available, subsequent expense could have been avoided and the money used where it would be of benefit to the industry as a whole as well as to the individual interest concerned.

There are certain "dead cats" among mining properties, it is declared, that have more than nine lives. With a periodicity that is surprising, ways are found to bring these properties before potential operators in such a favorable manner as to result in another examination. The duplication of effort and the waste represented by this procedure are thought to be such as to justify the study of some plan likely to prevent such useless effort.

North Butte-Tuolumne Merger Should Help Butte

Hope to Reopen Granite Mountain Shaft and Develop Main Range—Will Issue 7 per Cent Bonds to Finance Operations —Leasers Will Be Given Chance

By Carl J. Trauerman
Mining Engineer, Butte, Mont.

MUCH is expected in Butte of the reorganized operations that will result from the absorption of the Tuolumne Copper Mining Co. by the North Butte Mining Co., finally authorized at a meeting of North Butte stockholders on Dec. 29.

The merger was consummated mainly through the efforts of engineers, namely Richard M. Atwater, Jr., of New York, and Paul A. Gow, of Butte, assisted by William P. Jahn, of Milwaukee, president of Tuolumne Copper.

In 1905, Mr. Atwater examined the Speculator mine. The outcome of his report was the formation of the North Butte Mining Co. by John D. Ryan, Thomas F. Cole, and a coterie of steel men from Pennsylvania, and the purchasing of the Speculator property and contiguous ground. The properties produced millions and paid $39.50 per share in dividends, or a total of $14,657,000. The bulk of the richer ore was hoisted through the Speculator shaft, of which a photograph accompanies this article.

As the ore became of lower copper tenor with depth, it was necessary to increase the scale of mining operations, and the Granite Mountain shaft was sunk to a depth of 3,700 ft. and equipped with 1,500 hp. direct-current electric hoist in 1915. This hoist, which is one of the largest electrically driven hoists in America, is equipped to handle seven tons of ore, from a depth of 5,000 ft., making the round trip in a little over two minutes. In 1917 and 1918 this four-compartment shaft was lined with solid concrete. Until the shutdown in 1923, the Granite Mountain was the main working shaft. The "hill" properties of the North Butte Mining Co. contain 220 acres.

Since 1912 North Butte acquired 936 acres in the east side of the Butte district, this being known as the Sarsfield group. Developments included the sinking of the Sarsfield shaft to a depth of 900 ft. and crosscuts northwest and southeast. However, commercial ore was not encountered, and, judging from Tuolumne developments since that time, it is conceded that the Sarsfield developments were carried on at too shallow a depth, the many veins that were encountered being in the oxidized or leached zone.

The Tuolumne Copper Mining Co. was formed two decades ago, by Ed. Hickey and associates, to work the Tuolumne claim, consisting of five acres next to the Jessie property of North Butte. This was worked until the lower-grade ore was encountered, and therefrom was paid 65c. per share in dividends.

In 1916 the activities of the company were transferred to the east Butte area, and included the taking over and developing of eighty acres formerly owned by the Butte Main Range Copper Co. and the Colusa-Leonard Extension Copper Co. These properties lie contiguous to the Sarsfield group of the North Butte Mining Co.

Developments were carried on through the Main Range shafts, which now is 2,200 ft. deep and equipped with a 350-hp. alternating-current electrically driven hoist. From the upper or oxidized levels the Main Range group produced over $1,000,000 gross.

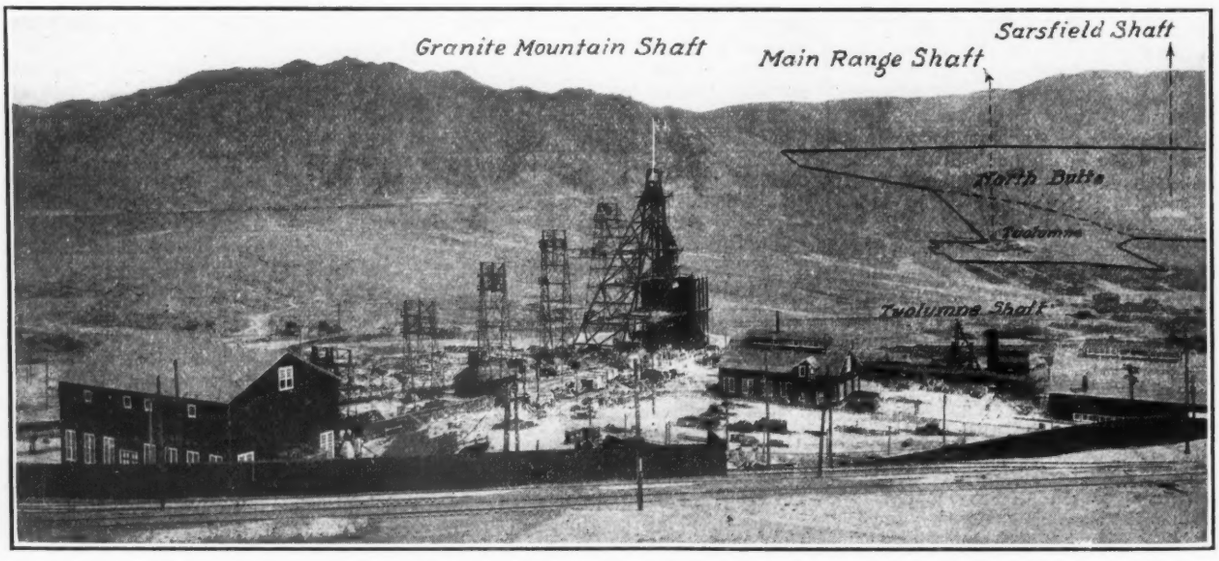
Oil Royalties Enrich Texas College

THE University of Texas received, to Dec. 1, 1925, royalties from its oil lands in Regan County amounting to $1,800,000. It has not yet been decided whether this sum must be placed in the permanent fund, with only the interest available, or whether it may be used for the construction of buildings which are badly needed.

To carry on work at the deeper levels and to cut across the Continental fault more funds were needed, and to provide the necessary working capital the company was reorganized under the name of the Tuolumne Copper Co.

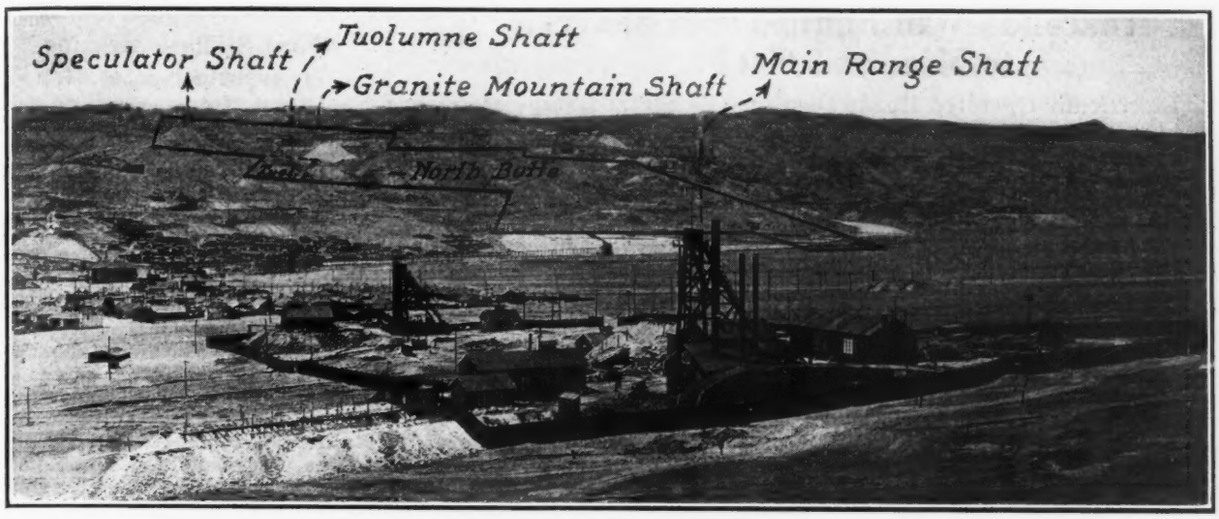
A comparatively short time ago Tuolumne ran a long crosscut from the 2,000 level of the Main Range and cut the Continental fault, going through to the east, where several bodies of primary commercial copper ore were encountered. With the orebodies came a great amount of water and slimes, and it took many months to overcome these difficulties. The orebodies were examined by many geologists and engineers, including R. M. Atwater, Jr.; and the opinion seems to be that the finding of commercial ore east of the Continental fault is likely. East of the fault the structure had an upthrust estimated to be 600 ft.; thus the 2,000 level east of the fault would coincide with the 2,600 level on the west side.

North Butte has been negotiating to make an arrangement whereby it might work its Sarsfield group through the Main Range shaft. It finally was decided to merge the two properties, through the medium of North Butte Mining Co., which changed its capital structure from an authorized issue of 600,000 shares, $15 par, to 1,000,000



Granite Mountain shaft of the North Butte company

Looking east, across Silver Bow valley, showing in the background the Main Range and Sarsfield workings



Main Range shaft of the Tuolumne company

Looking west, across Silver Bow valley, showing in the background the main North Butte workings

shares, $10 par. There are outstanding 430,000 shares of North Butte, and 195,000 shares of the new $10 par stock will be given in exchange for the present outstanding 195,000 shares of $10 par stock of the Tuolumne Copper Co., and North Butte will assume the outstanding indebtedness of Tuolumne Copper Co., including $302,000 of bonds.

To provide working capital North Butte is authorized to issue up to $1,500,000 of ten-year 7 per cent convertible serial bonds, or in lieu thereof $1,500,000 of ten-year 7 per cent convertible serial debenture notes, convertible in amounts of $500,000 into stock at $8, $10, and $12.50 per share respectively. Approximately 152,500 shares of stock will be required for conversion purposes, if all bonds ultimately are converted. North Butte was authorized to go through with this program by unanimous vote at a meeting held on Dec. 29, 1925, at which about 70 per cent of the outstanding stock was represented.

Should all the bonds be sold before conversion there will be outstanding 625,000 shares of stock, leaving 375,000 in the treasury. There also will be outstanding $1,500,000 of North Butte bonds and $302,000 of Tuolumne bonds. In the event of the conversion and retiring of all bonds the company will have outstanding approximately 777,500 shares, with total par value of $7,775,000. Present assets of North Butte are given as $10,484,701 and Tuolumne at $4,427,488, or a total of close to $15,000,000.

In the "hill" properties of the merged companies many thousands of tons of copper ore are developed assaying between 3 and 4 per cent. It is proposed to open the Granite Mountain shaft and assign this ore to leasers, who through careful working will sort the ore underground and ship ore of a higher grade than "run of mine." It is believed that this system of working will employ between 350 and 400 men, and good results are anticipated.

At the Main Range on the 2,000 and 2,200 levels the ore will be followed through the Continental fault, and drifts and crosscuts will be run to prospect the Main Range and Sarsfield groups thoroughly. This will require an initial complement of about 100 men.

If present plans mature the two operations will necessitate the employment of 500 men, giving to Butte an additional payroll of approximately $65,000 per month and an additional expenditure of about $35,000 per month for supplies.

R. M. Atwater is a well-known New York mine promoter. Paul A. Gow, present manager of Tuolumne Copper Co., was graduated from the Colorado School of Mines with the class of 1907, and immediately entered the engineering department of the Anaconda Copper Mining Co. He later developed a commercial mine at the Pilot-Butte property, which was sold to the Anaconda company. William P. Jahn was president of Pilot-Butte.

In 1916 Mr. Gow took charge of Tuolumne affairs. He has been instrumental in both developing the property and raising the necessary cash to do so, being assisted in the latter undertaking by Mr. Jahn.

Whether the new North Butte will be successful in developing a new commercial mineral area in Butte is at present a speculation, although developments are encouraging. In any event, it is believed that the question as to whether commercial orebodies exist at depth east of the Continental fault will be settled.

Ajax, at Cripple Creek, Goes to Granite Mountain

The Granite Gold Mining Co. has purchased the Ajax mine, at Cripple Creek, Colo. The Ajax was a subsidiary of the Tonopah Mining Co. of Nevada. In October, 1924, negotiations were begun, but there was some misunderstanding as to price, and litigation followed. This has been adjusted, and by the acquisition of the Ajax the Granite gets one of the best-equipped properties in Cripple Creek district, with a shaft 2,000 ft. deep which will permit of ready exploration of Battle Mountain.

Magma Copper Plans to Sink 2,500-Ft. Shaft

An improvement program, involving an expenditure of $500,000, including the sinking of a new 2,500-ft. shaft and the construction of an electrically operated surface tramway, has just been announced by the Magma Copper Co. of Superior, Ariz., through William Koerner, manager. The work of grading for the surface tramway has already been started and construction of the new shaft will be begun within the next thirty days, it is announced.

The new shaft will be sunk west of the present workings at Superior, a little northwest of the general offices of the company. It will have four or five compartments, and the equipment will be modern in every respect.

New Mining Procedure Helps Quincy Mine Deep Levels

Quincy Mining Co., opeating at Hancock, Mich., is opening rich rock at depth in both Nos. 2 and 6 shafts, mass being much in evidence in all openings on the Pewabic lode and its branches. Silver recovery also is large, averaging approximately 10,000 oz. per month. The mine has steadily widened, and the present working area is fully as wide as on several levels immediately above. The mine at depth is fully three times the width near the surface.

The present method of mining has solved the problem of crushing so prevalent in abandoned upper levels, and made deep mining possible. Substantial vertical pillars left in all levels in both shafts for the last 2,000 ft. have proved adequate to carry the weight, and all of these openings can be entered. This will make possible the eventual mining of the pillars. Ground between the 46th and 67th levels in No. 6 shaft is badly crushed, owing to air blasts in inadequately supported openings, and it is impossible to enter any of these intervening levels. The openings now are so packed together that there is little apprehension of a recurrence of serious cave-ins.

Anaconda Will Equip Three Shafts to Mine at 5,000 Ft.

Electrically Operated Hoists Displace Old Steam Equipment—Portends Long Life for Mines in Anaconda Hill, "Richest on Earth"

ACCORDING to announcement of J. R. Hobbins, vice-president of the Anaconda Copper Mining Co., the Badger, Mountain Consolidated and Belmont mines of the company, at Butte, will be equipped with new electric hoisting equipment making feasible the sinking of the shafts to a depth of 5,000 ft. For the last year or more shaft sinking has been carried on at several of the mines, including the three above named, the object being the development of the lower levels. Because of favorable showings, it has been decided to equip the principal mines of the district for operation to the 5,000-level, and the Badger, Mountain Consolidated, and Belmont have been selected as the first three mines to be so equipped. The type and design of the new equipment have been determined upon, and the installation will proceed as soon as delivery of equipment can be made by the manufacturers. It is expected that the hoists will be direct current, with synchronous motor-generator sets and Ward-Leonard control. They will have 2,150-hp. motors capable of hoisting 1,500 tons per day from 5,000 ft.

The Badger is one of the furthermost north mines of the company on the "hill," and the Belmont the furthermost south, the Mountain Consolidated being about midway between the two.

Present depth of the Badger shaft is 3,573 ft.; the Mountain Consolidated, 3,122 ft. and the Belmont, 2,773 ft. The deepest shaft in the district is the Granite Mountain, of the North Butte Mining Co., which is 3,770 ft., and the deepest shaft of the Anaconda is the Steward, which is 3,633 ft. deep. The average hoisting distance in the district is now 2,200 ft.

For many years all the mines of the Anaconda Copper Mining Co. in Butte, with the exception of the Orphan Girl, have been hoisting with air or steam equipment. The Orphan Girl is equipped with electric hoist, as is the Granite Mountain of the North Butte Company, the Black Rock of the Butte & Superior, and the Elm Orlu, which is owned by the Clark estate.

The significance of this announcement is the apparent confidence of Anaconda officials in the profits to be obtained in deep mining. Otherwise this large expenditure for equipment would not be made.

Ford Studies Airplane Transportation to Mine Prospects

IN CONSIDERING airplane transportation to the mining camps of northern Canada, representatives of Henry Ford are studying the minimum requirements for equipment up to the point of shaft sinking, but including that necessary for diamond-drilling operations. Studies of the average daily ration per man also are being made.

Most of the mineralized areas of northern Canada are distant from existing means of transportation. Even the newly discovered deposits in the Red Lake region of Partricia, Ontario, are 125 miles from the nearest railroad.

White Caps Is Developing Orebody on 1,200 Level

A large and rich orebody is being developed on the 1,200 level of the White Caps mine, at Manhattan, Nev. The East orebody has been drifted on for 110 ft. without disclosing its limits, with estimated average width of 8 ft. and estimated average value of at least $50 per ton. The ore shows only a small percentage of antimony and arsenic, much less than on the 1,120 and other upper levels, where a large tonnage has been developed for mining, which simplifies the metallurgical problem, although even this 1,220 level ore will require roasting before cyaniding. It is estimated that 100,000 tons of $25 ore is now available, with chances for a large additional tonnage when the oreshoot is developed on the next deeper level, as it seems to be increasing in size with depth. Sinking from the 1,220 level will be started soon, and preparations are being made to sink an additional 500 ft. The White Caps orebodies are in limestone, and the geology has been well worked out.

Shattuck-Denn Merger Suit Dismissed

The suit of a group of stockholders of the Shattuck and Arizona Mining Co. to prevent consolidation with the Denn-Arizona Copper Co., through an exchange of stock with the recently incorporated Shattuck-Denn Mining Corporation, has been dismissed by the judge of the district court of St. Paul, Minn., where the suit was filed on Nov. 17, 1925.

Some Picture Rock!

Rumors coming from Prescott, Ariz., herald the discovery of bonanza gold ore at the Monte Carlo mine, 12 miles northeast of Hot Springs. According to Francis Clark, mining engineer and assayer, samples from a 6-in. stringer which has been opened up for a length of 200 ft. contained from $2 to $4.80 in gold per pound. John Revello, an Italian miner, is the principal owner of the property.

High-Grade Ore Reported From Ely, Nev.

Reports from Ely, Nev., state that the west drift in the Piermont mine has broken into a full face of high-grade silver ore. The strike is believed to prove that the old vein, which produced several millions in early days, extends beyond the fault into virgin territory.

Cœur d'Alene Syndicate Prospects

The zinc-bearing vein struck in its mine in the Cœur d'Alene district in Idaho by the Cœur d'Alene Syndicate recently has increased in width from 12 in. to 3 ft. in 80 ft. of progress in the west drift. The vein is brightened by a sprinkling of galena. Operations are proceeding at a depth of 2,000 ft.

Eureka, Nev., Mines, Ship About Twelve Cars Weekly

Mining operations and production in the Eureka district, in Nevada, continue without much change. About 300 tons of ore per week is being shipped to the Midvale smelter, in Utah, from the Richmond-Eureka properties on Ruby Hill. Eureka-Holly is shipping at the rate of four cars of flotation concentrates and two cars of high-grade ore per week from its properties on Adams Hill. This company has resumed development work on the high-grade sulphide orebody opened on the 900 level some time ago, the work having been temporarily delayed on account of lack of timbers.

Bingo Shareholders Have Stormy Meeting in London

A special meeting of the shareholders of the Bingo mine, in the Herb Lake district of northern Manitoba, recently held in London, England, was of a stormy character. Joseph Myers, of Winnipeg, the promoter of the enterprise, spoke for two hours in justification of his course as managing director and quoted favorable reports to prove the value of the mine. He also attacked William Maxwell, the president, accusing him of gross negligence and incompetency. Myers asked the shareholders to let him prove his claims for the mine with a ten-ton stamp mill.

Maxwell read evidence taken in the trial at Winnipeg which pointed to the salting of assayed specimens. He stated that a petition for the winding up of the company was launched to prevent the English company from falling under the control of Canadian investors. A resolution was moved by Dr. Blake, chairman of the Canadian company, increasing the number of directors to seven. The shareholders voted to stop the petition for winding up, so that proceedings will be dropped. The project for the erection of a ten-ton stamp mill is under consideration.

Silica Deposit in Virginia to Be Exploited and Developed

A deposit of silica at Scottsville, Va., which is said to be remarkable both as to its extent and its purity, is to be developed by installation of a mill for grinding the rock and reducing it to the form required for use in the arts and trades.

New Pit Mines Opened on Marquette Range

Pickands, Mather & Co., large operators in the Lake Superior iron district, have awarded a contract to the Guthrie Co. to remove approximately 420,000 cu.yd. of overburden from lands recently taken under lease from the Volunteer Ore Co., near Palmer, on the Marquette range. A new open-pit mine will be getting out ore there next summer and will be operated by the Palmer Mining Co., a new subsidiary of Pickands, Mather & Co. The mine will produce low-grade siliceous iron ores, which have been increasing in demand. Work being done by the contractors is in charge of Captain Frank Kane, who recently joined the Guthrie firm. He attracted attention by making records in drifting underground at the Odgers mine, on the Menominee range, and will later have charge of a section of the tunnel which the firm is to drive through a part of the Rocky Mountains for one of the railroads of the West.

M. A. Hanna Co. is also to open a new pit mine at Palmer this year. This will be the last year that this company will mine from the Richmond pit, owned by the Oliver Iron Mining Co., as the lease will expire at the end of 1926.

The Empire mine, idle for several years, has been taken under lease by the C. K. Quinn & Co. Siliceous ores also will be produced from this property in 1926.

Bristol Silver Mines Encounters New Orebody

An important strike of silver-lead-copper ore was made at the property of the Bristol Silver Mines Co. near Pioche, Nev., early in January, the raise being run from the 900-ft. level about 250 ft. from the main shaft penetrating an 8-ft. face of high-grade ore. The area in which the ore was found is in an entirely undeveloped part of the property and is the result of the recently planned development campaign.

A generator recently installed at the Black Metals mine will furnish power for the Bristol Silver Mines. The two-mile transmission line is about completed, and everything should be ready for work by the spring.

Ore shipments for the week ended Jan. 1 were as follows: Combined Metals, 750 tons; Black Metals, 100 tons, and Bristol Silver 135 tons, a total of 885 tons, the decrease being due to the holidays.

Will Reopen Rawley Mine

The Rawley mine, near Salida, Colo., which was famous for its big yield of silver and lead ore, recently has been visited by a staff of engineers, and it is expected that the Rawley Mines, Inc., will have the old producer working at capacity by spring. For power it will have ready access to the hydro-electric plant which supplies the city of Salida and the country for miles around. The company is financed by the Harry Payne Whitney group, of New York, the American Smelting & Refining Co., and the Stearns-Rogers Co., of Denver.

Utah Led Western Mining States in 1925

Production Valued at $82,762,000—Dividends $12,500,000—First in Silver; Second in Lead; Third in Copper

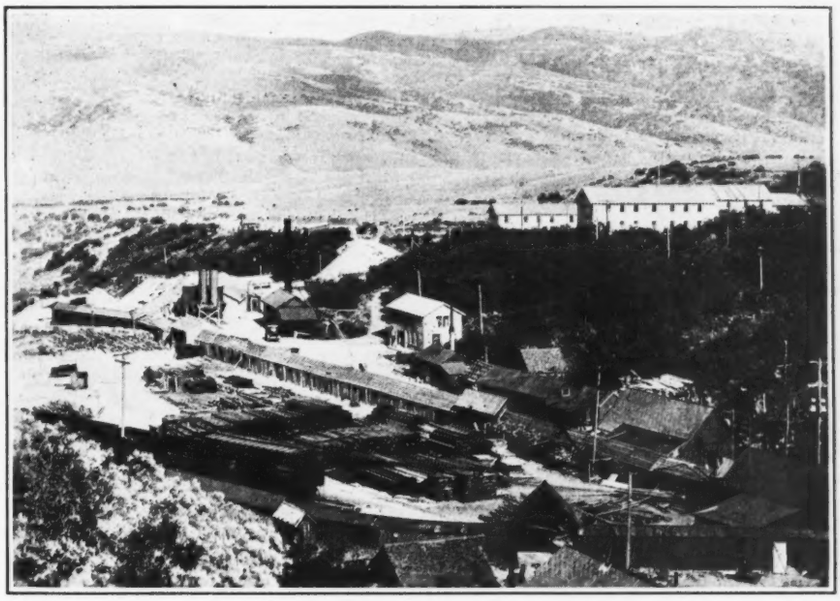
By Gail Martin
Special Correspondent

PRODUCTION of silver and lead from Utah mines for the year 1925, amounting to 21,177,000 oz. and 302,168,000 lb. respectively, exceeded that of any year since mining was begun in the state by General Connor's soldiers in 1862. The quantity of copper, the most valuable output of the state, was slightly less than in 1924. Zinc production for 1925 was nearly triple that of 1924. The value of non-ferrous metal output amounted to $82,763,000, compared with $67,000,000 in 1924. Utah maintained its rank as chief silver-producing state in the United States, a position held every year since 1920, and set a record 2,040,000 oz. higher than the previous highest total produced by Utah during 1923. Silver production in 1924 amounted to 17,253,000 oz. Utah's total for 1925 was larger than the combined outputs of Nevada, Arizona, and Colorado. The value of silver increased from $11,559,974 in 1924 to $14,612,000 in 1925. Tintic Standard was the largest silver producer in the state, Chief Consolidated second, Park-Utah and Silver King Coalition, third and fourth.

Dividends paid by mining companies in Utah in 1925, according to the preliminary estimate by V. C. Heikes of the U. S. Bureau of Mines, totaled approximately $12,500,000, exclusive of $2,492,232 paid by the United States Smelting, Refining & Mining Co., which controls mines at Eureka and Bingham as well as mines in other states.

Utah Copper paid during 1925, $6,904,082; Utah Apex, $686,660; Tintic Standard, $1,959,955; Park Utah Consolidated, $312,000; Silver King Coalition, $1,215,060; Park City Mining & Smelting Co., $394,200; Ohio Copper, $149,000; Mammoth, $79,064; Keystone, $67,500; Iron Blossom, $375,000 (a liquidation dividend); Eagle and Blue Bell, $178,629; Chief Consolidated, $200,644; and Bingham Mines, $167,375. Up to the end of the year 1925, Utah metal mines disbursed approximately $267,002,658.

By producing 302,168,000 lb. of lead, Utah displaced Idaho from second place, a position long held by the Gem State. Production of gold increased about 21 per cent, from $3,028,162 in 1924 to $3,681,000. Practically all of the gold recovered came from ores and concentrates smelted. Utah Copper, Chief Consolidated, the United States mine, Park-Utah, and Utah-Apex were the chief gold producers.



Park-Utah Mines Company's property, showing shops and offices, at the portal of the Ontario No. 2 Tunnel at Park City

Production of copper decreased from 242,138,165 lb. in 1924 to 238,277,500 lb. in 1925, but the value increased from $31,720,100 to $33,621,000. Utah retained its place as the third largest producer of copper in the United States, as a result of operations of the Utah Copper Company, the largest producer. Output of the Bingham mine averaged approximately 18,000,000 lb. monthly.

Output of lead increased from 233,910,875 lb. in 1924 to 302,168,000 in 1925, an increase of 27 per cent. Value increased from $18,712,870 to $27,376,000. Utah Apex company greatly increased its output, becoming the largest producer of this metal in the state. Silver King Coalition, Tintic Standard and the United States companies followed next in importance.

Zinc recovered from ore and concentrates increased from 18,562,772 lb. in 1924 to 45,368,000 lb. in 1925. This increase was due in a large part to the

successful operation of the custom flotation plant of the International Smelting Co., where mixed ores were reduced to lead concentrate smelted locally, and the zinc concentrates shipped to Great Falls, Mont. The United States Smelting, Refining & Mining Co. operated its wet mill and electrostatic plant at Midvale and also a small pilot flotation plant while the large flotation plant was under construction. At Bauer, the Combined Metals Reduction Co. treated zinc-lead ore largely from Nevada but partly from the Bullion Coalition mines property, near Stockton. The United States mine, at Bingham, was the largest zinc producer, Park Utah Consolidated second, Utah-Delaware third.

News From Washington

By PAUL WOOTON
Special Correspondent

Tariff Commission Will Investigate Fluorspar

Producers Ask Increase Under "Flexible" Clause From $5 to $7.50 per Ton—Claim Domestic Supply Adequate

THE United States Tariff Commission has yielded to the appeal of the $10,000,000 fluorspar industry to investigate its need for a greater degree of tariff protection. An increase of duty from $5 a ton to $7.50 a ton is asked. The commission is proceeding with an investigation of the merits of the claim.

Present requirements of the country for fluorspar are 150,000 tons annually. Nearly half of that amount now is coming from foreign sources, whereas only 20 per cent of our requirements were imported before the war.

Domestic mines are in a position to supply the entire needs of the country, as their war-time output, when imports almost ceased, were much in excess of the present demand. Fifty-five per cent of the potential capacity is in Illinois and 35 per cent in Kentucky data submitted to the Tariff Commission show. At an $18 price, even the low-cost producers have a very narrow margin of profit, it is contended.

Sixty per cent of imports come from the British Isles, where fluorspar production is a byproduct of lead mining.

The amount of the cost which is allocated to lead and the amount to fluorspar is a matter of bookkeeping, applicants for the increased duty declare. Of the remaining imports, 20 per cent come from Germany and 20 per cent from South Africa. The invoice price of the imported product was $10 in 1923 and $11 in 1924, but was reduced again to $10 in 1925. Marine freight is $3 a ton. With a $5 duty the price of the foreign material at the seaboard is the same as the present price, f.o.b. cars at domestic mines. Fifty per cent of the consumption is at Pittsburgh. Inland freight from the seaboard to that point is $5. From the domestic mines it is $3.50. Thus domestic producers have an advantage of $1.50 at the point of principal consumption. At Birmingham inland freight is $2.50 in each instance.

As the large consumers also are domestic producers, it is not known what their attitude will be toward the proposed increase in the duty.

Bureau Wants Utah Helium

A supplemental appropriation of $130,000 has been asked by the U. S. Bureau of Mines for the purchase of the gas well of the Utah Oil Refining Co. near Woodside, Utah. The discovery of helium-bearing gas at that point led the president in March, 1924, to withdraw the area as Helium Reserve No. 1. The Bureau of Mines estimates that the helium content of the gas in the Woodside structure is 350,000,000 cu.ft. As the entire structure is obtainable, there is no chance for the gas to be dissipated through neighboring operations.

Bureau of Mines Devises Measures for Crushing Force

The purpose of an investigation being conducted at Salt Lake City, Utah, by the U. S. Bureau of Mines, is to measure the work done in the crushing or grinding of ores. Accurate measurement of work done on the material crushed, and of the work expended in crushing, are the principal factors in this problem. Measurement of work done in crushing or grinding has been confined to quartz. A method of surface measurement has been devised which gives the surface measurement on quartz without recourse to average particle size. This method is based on the rate of dissolution of the material in a suitable solvent. A crushing apparatus has been devised in which crushing is done by means of a falling ball, and the work absorbed by the apparatus measured by means of deformation of soft wires. Crushing tests are being conducted and the relationship of work done to surface produced is being investigated. Microscopic and photographic methods will be utilized when possible in supplementing the results otherwise obtained and in the graphic representation of certain phases of the investigation.

Former Owners Returning to Salida

Many old-timers are returning to Salida, Colo., and it is their purpose to reopen the smelter at that place early in 1926. If this is done it is certain that mining in the area known as Como, Blue Bird, Madonna, Columbus, Monarch, Hawkeye, and Highland will be revived.

New Rumanian Law Restricts Foreign Ownership of Mineral Lands

THE amended mining law of Rumania prescribes that state lands (oil or mineral bearing) can be concessioned to any enterprise that was in existence at the time of the promulgation of the mining law (July, 1924), if the majority of its capital stock is owned by Rumanians and Rumanian citizens are in a majority on the board of directors and in the management. "Majority" presumably means 51 per cent or more, instead of 60 per cent, as formerly required. The stipulation that the share capital in Rumanian hands must be represented by "nominative" certificates has also been removed.

Suit Based on Damages Alleged to Be Due to Miner's Phthisis

Alleging that the dust-laden air in a mill treating copper ore, and operated by the New Cornelia Copper Co., at Ajo, Ariz., is the direct cause of his contracting tuberculosis, C. F. Whisler, former shift boss for the company, filed suit in the Superior Court in Pima County, recently, asking for $25,000. The complaint claims that Whisler, while in the employ of the company, was compelled to work in dust-laden air, and that he is now suffering from the effects of the dust, his malady being in the form of tuberculosis. This is the second suit of this character to be filed in recent years in Arizona.

Binghamton Copper Co. Sold to Nevada Capitalist

It is reported that Nevada interests, represented by Howard W. Squires, of Pioche, have purchased from Senator Reynolds, of New York City, the Binghamton Copper mine, near Stoddard, in the Mayer district, in Arizona. The Nevada company contracts to expend at least $200,000 on the development of the property. The Binghamton property was a steady producer several years ago.

Lower Freights Help Shipment of Michigan Copper

Rail shipments during January will absorb refined copper production for the month in the Michigan district. Orders already on the books for February delivery seem to assure a brisk business for that month. The bulk of the metal is going to mid-West points. Reduced freight rates on copper to lower Michigan points have proved advantageous to Michigan producers, putting them in position to compete for the mid-West markets. Rates now are 30c. per 100 lb., a reduction from 47c. in winter, compared with a reduction from 38c. in summer. Operators are hoping to obtain even a lower rate, as well as lower rates on shipments to Eastern points.

Toronto Letter

By Our Special Correspondent for Northern Ontario

Noranda Reaches Agreement Permitting Copper Export

Quebec Will Waive Penalty Tax for "Foreign" Refining—Recording Office for Red Lake

To clear the way for further operations and the future financing of the Noranda Mines, the company has decided to complete the option on the Horne property. There still remains $280,000 cash to be paid, and the vendors also receive a one-tenth interest in the mine. It has been decided to form a new company known as the Horne Mine Co., and, though it has not been officially given out, it is understood that it will have the same capitalization as the Noranda—that is 2,000,000 shares of no par value. The vendors will receive 10 per cent of these shares, the remainder going into the Noranda treasury. The balance of the purchase price—$280,000—which is not all due for two years, will be discounted at the rate of 6½ per cent. Originally the agreement provided that the vendors' stock would be pooled for a period of years, but the Noranda has decided to concede this point.

An agreement has also been reached by the company with the Quebec Government regarding the refining of copper outside the province. The Quebec Mine Tax Act provides that taxes shall be three times normal if refining is done outside the Province of Quebec, but a private bill will soon come before the legislature, permitting the company to ship blister copper outside Quebec without having to pay the penalty of increased taxation.

A public offering, according to a report, will soon be made of shares in the Waite-Montgomery property, which is controlled by N. A. Timmins. It is understood, however, that no offering will be made until Mr. Timmins is thoroughly satisfied with the value of the property and that no official statement on developments will be given out until the public offering is made.

A new discovery has been made on what is known as the No. 4 area of the Amulet. The find was made by surface trenches, and the grade of the ore so far uncovered is reported to be satisfactory.

The Anglo-French Co., which controls the Kirkland Lake Gold Mining Co., has taken up the last 500,000 shares at 10c. a share, putting $50,000 additional into the Kirkland Lake Gold treasury. It is understood that former blocks of stock purchased under the option agreement have been sold at prices which will reimburse the Anglo-French for practically all the money expended and will leave it with 500,000 shares of preferred stock and 500,000 shares of common stock.

To assist companies and prospectors in the new Red Lake area of northwestern Ontario, the government has decided to establish a branch recording office at Red Lake, which will be opened for business about March 1. The regulations of the department provide that certificates of record will not be issued until surveys have been made. As this is a hardship in a new district so far from a railroad and so far from baseline surveys, the government is establishing triangulation points on Red Lake, to which all surveys of mining claims will be tied. This will permit of an accurate claim map of the district being made, and the district as a whole can be later tied in to the nearest base line, which is about 50 miles away.

The Red Lake area lies to the northeast of the Bull Dog Lake section in Manitoba, where the Central Manitoba Mines is operating. The Mining Corporation of Cobalt has staked a large acreage in the latter section, and a shaft has been sunk to a depth of 42 ft., showing free gold practically all the way. The company has decided to install a plant and do a considerable amount of work during the early spring and summer.

"Noranda" to Be Incorporated as a Town

Application has been made to the Quebec Legislature for the incorporation of the holdings of the Noranda Mines, Ltd., in the Rouyn area of Quebec including the Horne mine, as a town under the name of "Noranda." The company's new smelter and concentrator will be within the limits of the municipality. In surveying and laying out the town, work on which will be begun as soon as possible, the company will have in view the needs of a future population of 15,000.

Seneca Increases Working Force to 300 Men

Seneca, the newest producer in the Michigan copper district, is making progress in building up its working organization. More than 300 men now are on the payroll, and the management has entered upon a program of development. Miners still are needed, but by spring it is expected that rock shipments to the mill will total 1,200 tons daily, or sufficient to keep two stamp heads in constant operation. Forty drills are employed. Capacity is sixty, which will be doubled by spring with completion of the addition to the compressor plant.

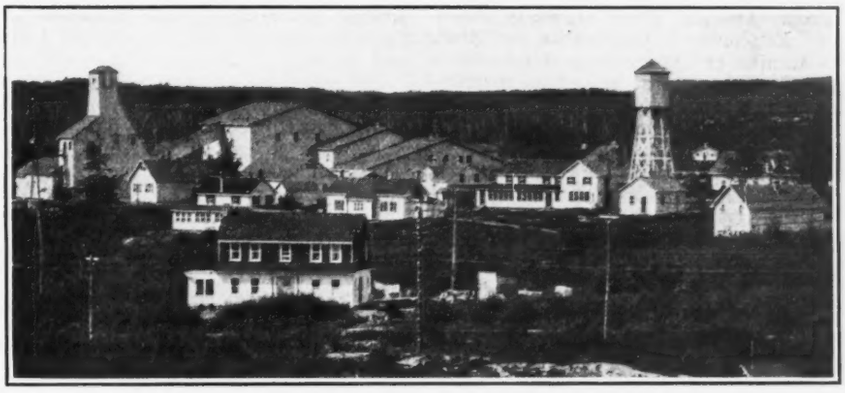
London Letter

By W. A. Doman
Special Correspondent

London Tries to Explain Failure of Copper Rise

Speculators Pushing Rhodesian Companies' Shares—Union Minière Production Much Less in December

London, Jan. 12—Because the price of copper has not risen as some prophets expected it would, attempts are being made at explanation. It is said that two opposing views obtain among the controllers of copper-mining properties in the United States: one party advocates restriction of production so as to raise the price of the metal; the other is in favor of an increase, the conclusion in the latter case being that with a more plentiful supply the price would be reduced and consequently stimulate demand in Europe. Some time ago a leading London statistician, Joseph Kitchin, pointed out that the world could spare only a certain amount of money annually for the purchase of metals, and he did not appear hopeful as to an immediate advance in the price of copper. So far his views have proved correct.



Wright-Hargreaves cyanide plant at Kirkland Lake, Ont., Canada

On the London Stock Exchange a large number of copper companies' shares are dealt in, many of the companies' properties being in Rhodesia. The managements themselves are first class and are not attempting to force matters, but are steadily going forward in the way of tests and developing the different areas under their control. It is the speculative parties who are endeavoring to push up the price of the shares, and hitherto they have not met with much success. Union Minière output for December was only 5,985 tons, and this reduction is rather upsetting the Rhodesian market. Considerable interest is taken in Minerals Separation, Ltd., on account of the various processes which it has devised for dealing with the extraction of copper and other metals.

The Anglo-American Corporation of South Africa has acquired an interest in the reserve shares of the Loangwa Concessions, and Sir Ernest Oppenheimer has been appointed to a seat on the board. Whether this means that the corporation will undertake the tech-

nical management, or whether, as has so frequently happened in other instances, it is a pure share deal, remains to be seen.

PLATINUM INVESTORS ON FENCE

A small section of the public here who take an interest in platinum shares are now awaiting results. During the last week they have seen both sides of the shield. Transvaal Consolidated Land & Exploration Co. has always been credited with possessing the finest known platinum area in its Onverwacht farm, and the latest cabled news is that in small sections very high values—up to 10 oz.—have been obtained. On the other side the Platinum Exploration Co. points out that the dunite occurrences on its various farms which at first looked so promising do not contain payable values, and the consulting engineer has advised the directors to abandon options on several of the farms.

When the Dome Mining Corporation began dredging in the Orbigo River, in Spain, in August last, it was hoped that shareholders would see some return upon their investment, which stood in the market at a heavy premium. Difficulties have been encountered, and returns have not yet been realized. The shares have slumped heavily — being now considerably below their par value of 5s.; but experts still regard the position hopefully. At the same time a rumor is in circulation that a second dredge is to be installed.

English Company Obtains Mining Concession in Russia

A contract has just been closed between the Ayan Corporation, Ltd., and the Russian Soviet government for the prospecting and exploitation of gold in the district of Ochotsk, in the Government of Kamtschatka. The concession runs for a period of thirty-six years, provided the English corporation spends at least 600,000 gold rubles per annum for the first four years for prospecting purposes and new working plants are erected. The Soviets are to receive 10 per cent of the value of the output. The Moscow government reserves to itself the right of purchasing the entire production.

Lead Mining in Tunisia Improves

Lead and zinc mines in Tunisia are witnessing a revival since the depression following the closing of the war until the end of 1923, when prices began to advance. Stock quotations have risen for all important mines, and it is generally considered that production will attain a high mark this year.

Les Mines Reunies, the richest lead mine in Tunisia, shipped 4,481 tons of lead ore during the first half of 1925, and shipments from the Algerian mine during the whole of 1924 amounted to 10,000 tons. The profits of the Mines Reunies attained 8,300,000 francs in 1924, and it is expected that this figure will be exceeded for the year 1925. Only 3,100,000 francs of indebtedness remains to be liquidated, and it is expected that this will be taken up this year.

Zinc Mine Used for Making Whiskey in Joplin

A sensation was created in the Joplin-Miami district on Jan. 13 when federal prohibition enforcement officers discovered one of the most elaborate illicit whiskey plants seized since prohibition went into effect in the United States, in the abandoned workings of the Keltner mine, about four blocks from the center of the town of Picher, Okla.

The plant included four wooden vats, each with a capacity of 10,000 gal., on the 210-ft. level over the mine; four copper stills each of 1,000 gal. capacity, on the 260-ft. level; and electrical pumps on the lower level to force the finished product to the 210-ft. level; and an electric hoist at the surface.

The mine, which was the property of F. W. Evans, of Picher, a prominent mine operator, until the first of the year, when it was sold to the Childress Lead & Zinc Co., has not been in operation since the mill burned down in 1923. The entrance shaft has been covered by an old building, to which there was entrance by a secret door through a garage. Two levels on which the whiskey plant was discovered were connected with a private telephone system. The big vats were filled with mash, but they were not operating, and no whiskey was found in the stills nor in the ground. At this writing, no arrests have been made.

Burma Mines Output in December 1,000 Tons Per Day

The Burma Corporation during the month of December, 1925, mined from its mines in Upper Burma 30.516 tons of ore, including 1,765 tons of high-grade. Of this 23,290 tons was milled in the treatment plant, producing 10,096 tons of lead concentrates; 11,852 tons of lead-bearing material, including 2,357 tons of high-grade ore, were smelted in the blast furnaces, producing 5,045 tons of hard lead for treatment in the refinery. Refinery products were 4,500 tons of refined lead and 478,000 oz. of refined silver. Of the silver production 67,668 oz. was recovered from the treatment of copper matte. The experimental zinc plant produced 1,826 tons of zinc concentrate, assaying 15.4 oz. silver, 9.3 per cent lead, and 44.4 per cent zinc.

In addition to the above, 845 tons of copper matte was produced from the treatment of accumulated smelter by-products and 4,654 tons of copper ore. Included in the tonnage of refined lead is 488 tons recovered from the smelting of copper ore.

Start First Unit of Great Falls Zinc Plant Addition

The first of the new units in the zinc plant of the Anaconda Copper Mining Co. at Great Falls, Mont., has been put into operation and will be running at capacity before the end of the month, bringing the capacity of the entire zinc plant up to 14,000,000 lb. per month. When the second unit is completed the plant will have a capacity of 20,000,000 lb. per month. Construction of additions in the copper department is proceeding rapidly, and before the end of the year all improvements should be completed, giving the Great Falls plant a capacity of 26,000,000 lb. of copper, 5,000,000 lb. of coarse copper wire, and 20,000,000 lb. of zinc per month. The entire program will cost over $3,000,000, of which the zinc units will cost about $1,300,000. In the enlarged plant an additional 200 to 300 men will be employed permanently.

Double Eagle Leases Property

The Double Eagle Mining Co. is developing its silver-lead property at Valley, Wash., and has arranged for the lease of the company's magnesite deposits on a royalty basis with an option to buy for $100,000 cash, according to A. J. Diedrich, a director of the company. The transaction is with C. W. Matthews and associates, of Spokane, who will pay a royalty of $2 a ton for calcines and $1 a ton for crude magnesite shipped, and will have two years to pay the purchase price and take over the title.

Slate Deposits of Nova Scotia to Be Developed

Development of a hitherto untouched natural resource of Nova Scotia is promised in the formation of the Acadia Slate Co., Ltd., with an authorized capital of $25,000, and offices in Wolfville. Extensive slate deposits have been discovered in King's County between New Minas and White Rock. The width of the belt appears to be about 900 ft. Although only a little has been opened up, there is evidence enough to indicate a very large body of first-class material.

New Crushing Plant at Negaunee

The Cleveland-Cliffs Iron Co. has the foundations and steel in place for the new district crushing plant for the Marquette range to be erected near its Maas mine, at Negaunee, Mich. A contract has been awarded to the Allis-Chalmers company for a jaw crusher, 40 by 42 in., a No. 10 gyratory crusher, and the necessary screens. Delivery will be made in March, and the plant will be ready to operate when shipping begins in the spring. The new crushing plant will handle ores from a number of the company's iron-ore properties. The old one was not large enough to meet the demand for the crushed grades. This demand has been steadily increasing of late years.

Carbonate Group Expands in Montana

J. A. Rowand, of Helena, Mont., has given an option on his Carbonate group of claims to a syndicate of Eastern men. The property is located at Silver Camp, Lewis & Clark County, and is opened by a long tunnel exposing a vein of ore containing lead, silver, and gold.

Under the management of Charles Rowand a raise will be driven from the tunnel level 200 ft. to the surface, after which a 200 ft. winze will be sunk from the tunnel. A 68-hp. portable compressor has been ordered.

Societies, Addresses, and Reports

Dexter Kimball of Cornell Heads American Engineering Council

Supports Federal Power Commission—Conference on Proposed Department of Public Works

New officers for American Engineering Council were elected at the annual meeting, Jan. 13 to 15, as follows: Dexter S. Kimball, of Cornell University, president; Gardner S. Williams, Ann Arbor, Mich.; O. H. Koch, Dallas, Tex.; I. E. Moultrop, Boston, Mass.; and A. W. Berresford, New York City, vice-presidents; H. E. Howe, Washington, D. C., treasurer; and John H. Finney, of Washington, chairman of the finance committee. L. W. Wallace was again elected executive secretary.

Gardner S. Williams, acting president, presided at the banquet. A short address was given by the president-elect. The principal speakers were Hubert Work, Secretary of the Interior, and D. R. Crissinger, Governor of the Federal Reserve Board. Many prominent members of Congress and government officials attended.

The sessions of the assembly were marked by keen interest, abiding confidence, and constructive action. Those who attended were gratified with the work accomplished and were inspired with the great sphere of usefulness immediately at hand.

The council had been invited to become an affiliated member of the Conference on Government in Industry. This it declined to do. However, it voted to lend its moral support to the purposes of the conference, by declaring it to be the sense of American Engineering Council that the government should not trespass upon the field of industry unless it was satisfactorily shown that the government could better engage in a particular business than private enterprises.

In view of the fact that bills have been introduced into Congress proposing to remove the Tennessee and Colorado rivers from the jurisdiction of the Federal Power Commission, and as other legislation is pending which if passed will undermine the commission. the assembly approved a resolution of disapproval of all such legislation. The assembly instructed its water-power committee and officers to use all possible means to defeat any legislation that tends to impair the usefulness of the commission or to destroy the functions thereof.

The conference on public works was attended by official representatives from sixty-three engineering and allied technical associations. It approved the draft of a bill providing that the Department of the Interior be named the Department of Public Works and Domain. As drafted the bill calls for the following four assistant secretaries: an assistant secretary having administrative jurisdiction over the design and supervision of architectural works; an assistant secretary having administrative jurisdiction over the design and supervision of engineering works; an assistant secretary having administrative jurisdiction over the administration and execution of the construction work of the Department of Public Works and Domain; and an assistant secretary having administrative jurisdiction over the public domain. Under the provisions of the bill all subdivisions of the Federal Government of an architectural, engineering, and construction character would be transferred to the Department of Public Works and Domain.

Spain Will Hold International Geological Congress in May

THE Geological Institution of Spain announces that, under the presidency of His Majesty Alfonso XIII, the inaugural session of the Fourteenth International Geological Congress will take place in Madrid on May 24, 1926.

Eminent geologists and engineers from Great Britain, Belgium, Denmark, Cuba, Mexico, Bulgaria, and elsewhere have expressed their intention to attend. Judging by the number of registrations already received, there will be an attendance of more than 1,000 delegates.

Various festivities have been arranged. From May 5 to 22 interesting excursions of geologic, industrial, and artistic nature have been arranged to Sevilla, Morocco, Ronda, Huelva, Cordoba, Burgos, and the Canaries.

During the congress excursions will be made to Almaden, Guadarrama, Aranjuez, and other points of interest, and from June 1 to Asturias, Bilbao, Catalonia, and the Balearic Islands. Papers written by contributers should be sent is before April 1.

The organizing committee will send information as to the congress on application to the Secretary, Plaza de los Mostenses, 2, Madrid, España.

Ceramics Course at Missouri School of Mines

A department of ceramics will be added to the Missouri School of Mines and Metallurgy at Rolla, Mo., it was announced Dec. 31, 1925, following a meeting of the executive committee for the School of Mines and Metallurgy of the Board of Curators of the University of Missouri. The new department will probably be opened next fall, according to Dr. Charles A. Fulton, director of the School of Mines.

The need for such instruction in the handling of clay at a school situated in the center of one of the largest clay-producing areas in the United States has been felt for a long time, according to Dr. Fulton. A committee composed of representatives of the clay industry in Missouri was responsible for bringing the matter before the curators of the Missouri School of Mines and Metallurgy.

Edward Dean Adams Awarded John Fritz Medal

Award of the John Fritz Gold Medal to Edward Dean Adams, of New York City, for achievement as "an engineer, financier, scientist, whose vision, courage and industry made possible the birth at Niagara Falls of hydro-electric power," is announced by the Engineering Foundation. This medal, according to the announcement, was established in 1902 in honor of John Fritz, pioneer in the American iron and steel industry. It is bestowed annually for notable scientific or industrial achievement and is the highest honor bestowed by the engineering profession in this country.

The award was made by a board of sixteen representatives of the American Societies of Civil, Mining and Metallurgical, Mechanical, and Electrical Engineers, with a membership of 53,000.

Edward Dean Adams was graduated as a bachelor of science from Norwich University in 1864 and afterward pursued engineering studies at Massachusetts Institute of Technology. It was on his decision that alternating current was chosen for the epoch-making plant of the Niagara Falls Power Co. in 1891 and for the transmission of the power by wire to Buffalo. Personally, he made extensive studies of the latest forms of electric generators and water turbines in Europe and America. He adhered to his momentous decision on the kind of electric current and equipment to be used despite contrary opinions emphatically expressed by Edison and Sir William Thomson (later Lord Kelvin). Now alternating-current and direct-connected hydro-electric units are almost universally employed for power development and transmission.

Mr. Adams was entertained at the Waldorf-Astoria on April 9 last year in honor of his seventy-ninth birthday by several hundred of his friends.

The John Fritz Gold Medal has been awarded to the following engineers: John Fritz, Lord Kelvin, George Westinghouse, Alexander Graham Bell, Thomas Alva Edison, Charles T. Porter, Alfred Noble, William Henry White, Robert W. Hunt, John Edwin Sweet, James Douglas, Elihu Thomson, Henry Marion Howe, J. Waldo Smith, George W. Goethals, Orville Wright, Sir Robert A. Hadfield, Charles Prosper, Eugene Schneider, Senator Guglielmo Marconi, Ambrose Swasey, and John F. Stevens.

Technical Mine Problems Discussed in South Africa

At the meeting of the Chemical, Metallurgical and Mining Society of South Africa, held on Nov. 21, papers were read on "The Mechanical Separation of Tube-mill Pebbles at the Robinson Deep," by J. M. Dixon, and on "The Effect on the Ventilating Current of Stopping and Starting a Main Fan," by R. A. H. Flugge de Smidt.

A conference was held at the Scientific and Technical Club in Johannesburg on Saturday evening, Nov. 28. The program included demonstrations of liquid oxygen, vortex rings, flotation of metals, and electrical prospecting apparatus.

Recent Technical Publications

Reviews, Abstracts, and References

A Digest of Physico-Chemical Mineralogy

Physikalisch - Chemische Mineralogie und Petrologie. By W. Eitel. Theo. Steinkopf, Dresden - Be., Germany. Price, 8 marks unbound; 9.20 marks, bound.

This is a summary of the new developments in our knowledge of physico-chemical mineralogy and petrology during the last ten years. No attempt is made to present a complete account of the science, which would require a much longer and different treatment. Mr. Eitel's book may be considered to be an excellent descriptive digest or index of all the recent literature of the subject. America's progress in scientific work of this kind is indicated by the fact that more than one-fourth of the first six hundred original articles cited were prepared by Americans.

The book is divided into two parts, the first dealing with general principles and the second with the application of those principles to concrete cases. Part I includes the laws of chemical and physical equilibria, inversions, thermal properties, binary, ternary, quaternary and more complex systems, and the components of magmas and of the earth's crust. The second part deals with new knowledge of the equilibria, inversions, the thermal and optical properties of oxide minerals, binary mineral systems such as MgO-SiO_2, ternary mineral systems, such as CaO-Al_2O_3-SiO_2, quaternary mineral systems, such as K_2O-Na_2O-Al_2O_3-SiO_2, and more complex mineral systems, such as pyroxenes, amphiboles, and micas. It includes also a summary of new facts regarding magmatic gases, pegmatitic processes, hydrothermal mineral syntheses, zeolites, weathering, mineral colloids, crystallization from aqueous solution, lime carbonate, dolomite, salt deposits, metamorphism, and crystalline schists.

It is surprising that a classified summary of recent literature on the subject can be so nearly complete and yet so brief. It will be very useful to those working in this field.

A. M. WINCHELL.

Mineral Resources — Recently published separates of "Mineral Resources, 1924" include: "Salt, Bromine, and Calcium Chloride," 9 pages, by K. W. Cottrell; and "Slate," 10 pages, by G. F. Loughlin and A. T. Coons. These bulletins are published by the U. S. Bureau of Mines and are obtainable for 5c. each from the Superintendent of Documents, Washington, D. C.

Refined Copper—The Dec. 1 issue of *Metall und Erz* (Berlin) contains a 12-page article by Hubert Altwicker "Uber den Einflusz von Kupferoxydul auf Elektrolyt und Raffinadekupfer."

New Zealand—The report of the New Zealand Geological Survey for the year ended May 31, 1925, 12 pages, is now available from the Geological Survey Branch, Mines Department, Wellington, N. Z.

Foreign Copper Markets—The Bureau of Foreign and Domestic Commerce, Washington, D. C., has recently issued a series of circulars on "Foreign Markets for American Copper and Brass Products," by R. M. Santmyers. Requests should specify Special Circular No. 234, Minerals Division.

Lubrication—The December issue of *Lubrication*, published for free distribution by The Texas Co., 17 Battery Place, New York City, is devoted to the lubrication of materials handling equipment, including electric cranes, ore bridges, and car dumpers.

Portable Mining Plants—F. A. McLean has an article of 22 pages in the January issue of the *Bulletin* of the Canadian Institute of Mining and Metallurgy (603 Drummond Building, Montreal; price $1) on "Portable Gas-driven Mining Plants." The paper reviews recent developments in the design of this type of equipment, and will be of interest to those who must select equipment for development or assessment work.

Canadian Mining Engineers—The bulletin above mentioned contains a list of all members of the Institute, and a copy of the charter and by-laws. It appears this month in somewhat enlarged form —6½x9½ instead of 6x8¾ in.

South America—The November issue of *The Black Hills Engineer* (Rapid City, S. D.; price 25c.) is a travel number and the feature article, by Bancroft Gore, is entitled "The Call of South America." The description of the journey down and the conditions existing there will be particularly interesting to those who contemplate contracting to work on that continent.

South Australia—Two mining reports concerning South Australia have recently come to hand, one the annual report of the Director of Mines and Government Geologist for 1924, 8 pages, and the other Bulletin No. 42 of the Mining Review of the Department of Mines for the half year ended June 30, 1925, 89 pages. Either may be obtained from the Department of Mines, Adelaide, South Australia.

Philippine Gold—A detailed description of gold occurrences of the Philippine Islands is given by Warren D. Smith in a 12-page article entitled "Gold Mining in the Philippines," in *The Far Eastern Review* for November. (16 Jinkee Road, Shanghai, China; price, $1 Mexican.) The Benguet Consolidated is the most important mine, being, in fact, one of the notable small gold mines of the world.

Mint Report—The annual report of the Director of the Mint, mentioned in a recent issue of *Mining Journal-Press*, is not available for free distribution, though the Mint Bureau has received a large number of requests for this volume under the impression that it could be obtained without charge. Although no price is stated on the volume in question, it is sold for 45c. by the Superintendent of Documents, Washington, D. C.

Patents

Amalgamator—No. 1,568,276. Jan. 5, 1926. C. C. Hamill, Randsburg, Calif. An amalgamating plate made of base metal covered with a mixture of mercury and silver filings, producing a rough surface.

Copper Recovery—No. 1,568,464. Jan. 5, 1926. J. W. Neill, Pasadena, Calif., assignor to Goro Matsukata, Tokio, Japan. Copper is dissolved out of ores by the use of acid, and is then precipitated by bringing the solution into contact with an intimate mixture of coke and iron. The resultant coke-copper mass is then smelted.

Grinding Mill—No. 1,568,752. Jan. 5, 1926. P. T. Lindhard, Brooklyn, N. Y., assignor to F. L. Smidth & Co., New York. A cylindrical ball mill with peripheral screens and means to return the oversize.

No. 1,569,930. Jan. 19, 1926. Peter Vilhelm Adolf Aage Herbst, Holte, Denmark, assignor to F. L. Smidth & Co., New York. Driving device for a tube or ball mill, using a drive shaft in line with the mill and operating through one of the trunnions of the mill. Perforations in the trunnion allow the ground material to be released.

Concentrator—No. 1,568,761. Jan. 5, 1926. W. E. Mendenhall, Lake City, Colo., assignor to the Union Metals Extraction Co., Lake City, Colo. An ore concentrator using an inclined riffled frame, means being provided for jarring the riffles while the pulp is flowing over them.

No. 1,569,512. Jan. 12, 1926. A. A. Lockwood, London, England. A reciprocating table with provision for subjecting the ore pulp to the action of an air blast paralled to deck of the table.

Matte Refining—No. 1,569,137. Jan. 12, 1926. R. L. Peek, Ottawa, Ont., and T. F. Torell, Aylmer, Que., assignors to National Trust Co., Ltd., Toronto. Steps in the process of electrolytically separating the copper and nickel in copper-nickel Bessemer matte.

Rock Drills—No. 1,569,436. Jan. 12, 1926. G. M. Nell, Cleveland, Ohio., assignor to the Cleveland Rock Drill Co., Cleveland. A rotative device for rock drills.

No. 1,569,542. Jan. 12, 1926. E. G. Gartin, Claremont, N. H., assignor to the Sullivan Machinery Co. A controlling valve mechanism for a rock-drilling motor, and feeding means therefor.

No. 1,570,239. Jan. 19, 1926. G. H. Gilman, Boston, Mass. Design for a hammer drill.

Cottrell Process—No. 1,569,492. Jan. 12, 1926. G. H. Horne, Glendale, Calif., assignor to International Precipitation Co., Los Angeles. Construction of the electrodes in a Cottrell fume precipitator.

No. 1,569,529. Jan. 12, 1926. Evald Anderson, Alhambra, Calif., assigned as above. A collecting electrode and a grounded metallic supporting frame.

No. 1,569,595. Jan. 12, 1926. F. H. Viets, Alhambra, Calif., assigned as above. A collecting electrode and metallic supporting member.

No. 1,569,597. Jan. 12, 1926. C. H. Weiskopf, Hawthorne, Calif., assigned as above. Design of discharge and collecting electrodes in Cottrell apparatus.

Men You Should Know About

H. W. Edmondson is in New York on business and will leave for Los Angeles on Feb. 1.

S. B. Hunt has been re-elected treasurer of the Standard Oil Co. of New Jersey.

G. A. Gow is leaving Sumatra, to join the staff of the Taio Gold Mining Co., in Japan.

S. J. Kidder has left Mogollon, N. M., and has established temporary headquarters at El Paso, Tex.

M. M. Duncan, vice-president and general manager of the Cleveland-Cliffs Iron Co., is wintering in Charleston, S. C.

L. D. Gordon, president and manager for the Round Mountain Mining Co. at Round Mountain, Nev., is in San Francisco on a business visit.

Heath Steele, vice-president of the American Metal Co., has left New York for a six weeks' trip to the company's properties in Mexico and the West.

K. C. Laylander, who has been carrying on extensive magnetometric surveys in the placer ground of British Columbia, is at the Hotel Aberdeen, in New York, for a few days.

O. C. Thompson, chief field engineer for the Porcupine Goldfields Development & Finance Co. in British Columbia, has removed his headquarters from Kimberly to Vancouver.

F. A. Olson, of the engineering force of the Cleveland-Cliffs Iron Co., will on Feb. 1 go to Crosby, Minn., to take charge of safety work and compensation for the Inland Steel Co.

A. S. Bailey, assistant superintendent of the Texas Company's oil refinery at Port Arthur, Tex., has been promoted to superintendent of the Casper (Wyo.), refinery of the same company.

W. H. Blackburn has returned to his San Francisco office after unwatering and sampling the Two G and other properties at Tybo, 60 miles northeast from Tonopah, Nev., for **F. W. Bradley** interests.

R. P. Raynolds, for many years superintendent of the Durango, Colo., plant of the American Smelting & Refining Co., has been transferred to the Denver office. He is succeeded at Durango by **R. E. H. Pomeroy.**

C. J. A. Dunlop-Cunningham, formerly field engineer for the Coniagas, of Cobalt, is in charge of a prospecting party which is on the way from Haileybury, Ont., to the Red Lake camp, in the Patricia district of Ontario.

Colonel Henry H. Armstead has recently purchased the Crown Point and Kootenay Belle mining claims, in the Ainsworth mining district of British Columbia. Messrs. Green Bros. and Burden, surveyors, of Nelson, B. C., are now taking the necessary steps toward securing Crown grants for them.

Chester Washburn, a geologist from the United States, is in charge of prospecting operations for the Taranaki Oilfields, Ltd., in the Poverty Bay district, in New Zealand. The company hopes to make a start with the first bore during the coming summer.

Albert O. Hayes, Ph.D., who has been for several years with the Canadian Geological Survey, has been appointed professor of geology at Lafayette College, Easton, at Pa. Professor Hayes is a graduate of McGill University, Montreal, and has conducted extensive researches in the Maritime Provinces and Alberta.

A. D. Hughes, who recently returned from an inspection trip to the property of the Guatemala Gold Dredging Co., in Guatemala, Central America, is now with the Ludlum Engineering Co. at 2 Rector St., New York City. This company contemplates extending its activities in placer fields and has placed Mr. Hughes in charge of this work.

W. J. Loring

W. J. Loring has returned from Los Angeles to San Francisco, to re-establish headquarters there.

Clyde H. Heller, president of the Tonopah-Belmont Development Co., recently went to British Columbia, to inspect mining properties that the company's engineers have examined. The ore reserve at the Surf Inlet mine, on Princess Royal Island, is practically exhausted, and for some time the engineers of the company have been searching for a mine or promising prospect on to which to move the Surf Inlet plant.

E. Miles Sharp, who has been resident general manager of the new Modderfontein gold mine since 1910, retired from that position at the end of December, 1925. Cornish by birth, he came to the Rand in 1895. For five years he was mine captain on the Nonose mines, then for eighteen months was in charge of the Warren Hill (for-sufferers from miner's phthisis in the Klerksdorp district. He has always been to the fore in organizing entertainments and raising funds for the sufferers from miners' phthisis in the Springkell Sanatorium. A farewell social was held for him on Dec. 18, when he was presented with a handsome gold cigarette case by the employees of the New Modder.

Obituary

William H. Hayden, mining engineer, president of Hayden Gold Mines, Ltd., of Porcupine, Canada, died recently in Batavia, N. Y. He was sixty-seven years old.

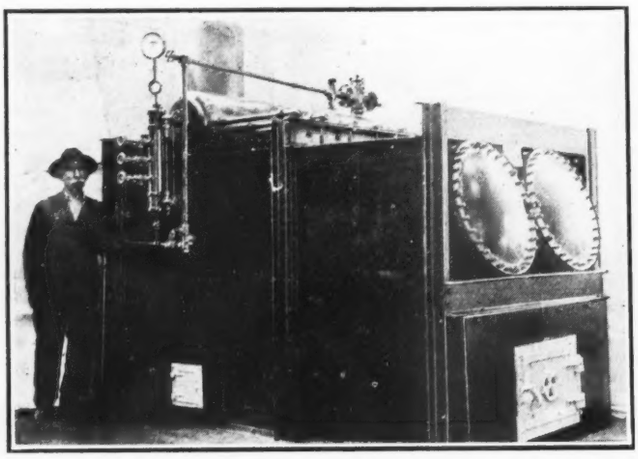
C. P. Dodge, of Houston, Tex., secretary and sales manager of The Texas Company, died in Memphis, Tenn., Jan. 13, as the result of injuries received in an automobile accident. Mr. Dodge had been with the Texas Company since 1903.

Charles Adams Colton, who was founder and principal for many years of the Newark Technical School, died recently in Morristown, N. J., at the age of seventy-three. He was graduated from Columbia School of Mines in 1873, with the degree of Engineer of Mines. Though he never practiced mining engineering as a profession, he served a short apprenticeship in mines and was a member of the A.I.M.E.

Henry L. Hamilton, mining engineer and petroleum geologist, died at his home in San Antonio, Tex., on Dec. 29, 1925, at the age of forty-two. Mr. Hamilton was a graduate of Leland Stanford University, class of 1904. For several years he was connected with mining enterprises in California and Mexico. Later he became interested in the oil industry and was at different times superintendent of the Montebello Oil Co. of California, superintendent of the coastal division of the Hamilton Oil Corporation, and superintendent of the Oil Issues Co. During the last three years he had devoted his entire attention to personal interests in the Somerset and other Texas oil fields. He was a member of the A.I.M.E. and the American Association of Petroleum Geologists. Mr. Hamilton is survived by his widow Mrs. Edna Durkee Hamilton, and one son, Lloyd Hamilton.

Andrew Frederic Crosse died at Capetown, South Africa, on Dec. 8, 1925. He was seventy-six years old. Before coming to the Rand, Mr. Crosse was assayer in London to Johnson, Matthey & Co. He came to Johannesburg in the early days and was for many years assayer to the Standard Bank of South Africa. When the Chemical and Metallurgical Society of South Africa was started in May, 1894, Mr. Crosse was elected vice-president, becoming president during the next year. About the year 1898 the use of fireclay liners and a flux containing manganese dioxide, introduced by Mr. Crosse and E. H. Johnson, enabled cyanide managers to produce a gold bullion (from zinc precipitation) of a fineness up to 950. After the South African War (1899-1902) Mr. Crosse was appointed consulting metallurgist to the East Rand Proprietary Mines. Later, for some time, he was resident on the Lisbon-Berlin gold mine, near Pilgrims' Rest, in the Transvaal. Returning to Johannesburg, he took over the laboratory of E. H. Croghan and was for many years in practice as a consulting chemist. About twelve years ago Mr. Crosse was elected an honorary life member of the Chemical and Metallurgical Society.

New Machinery and Inventions



This boiler's entire structure, save the lining and fittings, is of steel and absolutely unbreakable, it is claimed. It can be easily assembled

All-Steel Water Tube Boiler Sectionalized

Heaviest Piece 260 Lb.—Can Be Readily Assembled by Ordinary Mechanic—Made in 15-Hp. Units

A sectionalized water-tube boiler has been designed by the Straub Manufacturing Co., Oakland, Calif., to meet the needs of the company when it is called upon to furnish power plants to operate its sectionalized mining machinery. Some properties have not been worked because it has been impossible to transport to them the heavy ordinary type of boiler. The new boiler is of simple construction and consists of one or more units, depending upon the horsepower required. The cut shows a 30-hp. boiler of two units of 15 hp. each, the horsepower being conservatively rated by allowing at least 10 sq.ft. of heating surface per horsepower. Each unit consists of two circular flanged-steel heads, each fitted with a readily removable dished steel cover plate fitted with a special gasket and joint. These two heads are interconnected by a suitable number of perfectly straight water tubes expanded into the circular heads, which thus form the tube sheets.

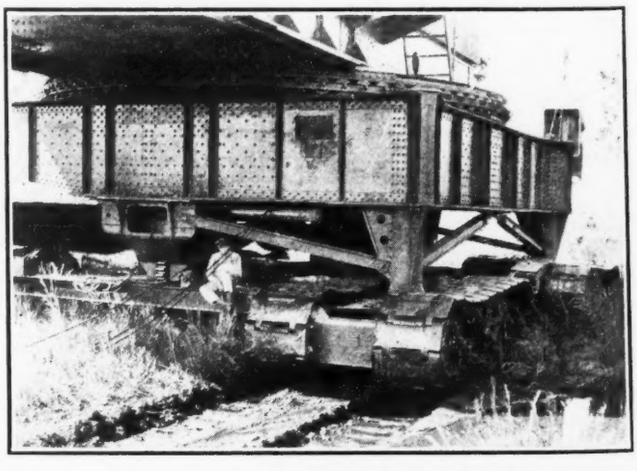
The entire assembly is set at a suitable inclination with the front end suspended to allow easy expansion and contraction without straining. The firebox is underneath the front and higher end, thus causing a very rapid circulation of water between the two heads via the tubes. The steam is discharged from the front head into a longitudinal steam drum not visible in the photograph but which extends from end to end of the boiler and is completely inclosed in the hot gases inside the boiler casing. A cross drum is usually fitted on the top of the boiler into which the steam discharges from the longitudinal drums, thus furnishing additional steam reserve and insuring dry steam even when the boiler is forced to its maximum capacity. The entire boiler is fitted with a sheet steel casing lined with firebrick and refractory materials, thus making a self-contained and very efficient steam generator. No part weighs more than 260 lb.

Caterpillar Mounting Now Used on 500-Ton Dragline

It is only fourteen years ago that the first dragline was mounted on caterpillars, the original machine being driven by an oil-engine and weighing about 96 tons. At that time it was seriously questioned whether this type of mounting would ever prove practical for excavating machinery. Today most all the smaller shovels are so equipped. The Bucyrus Company has recently equipped its Class 320 dragline with caterpillar mounting; also the 320-B shovel. This mounting is composed of four units, one under each corner of the base. These units are made up of two caterpillar belts 36-in. wide, each of which forms a continuous track for two large diameter rollers, an idler tumbler and a driving tumbler. The caterpillars are almost shoulder high to an average man. Some idea of the size of this new caterpillar-mounted machine is given by the fact that, ready for operation, it weighs approximately a million pounds, or 500 tons. Despite this tremendous weight, the bearing area of the caterpillar belts is such that it can propel itself across soft, yielding ground without difficulty.

This mounting eliminates a large number of the pitmen and track men which are required when such a machine is mounted on railroad trucks.

This 500-ton dragline is carried on four caterpillar units. It is shown moving through soft, yielding ground



Chemical Extinguisher Kills Fire Quickly

To cope quickly with fires of any origin but which are normally difficult to suppress, the Bastian-Blessing Co., 240 E. Ontario St., Chicago, Ill., has recently placed upon the market a new fire extinguisher which is extremely simple in construction and operation. It consists of two elements, a cone, filled with chemical salt, which upon heating evolves carbon dioxide and water, and a cylinder of liquefied carbon dioxide gas. These are connected by means of a suitable valve so arranged that when the valve is open it blows a stream of the powder on the fire.

To operate this extinguisher it is merely necessary to turn it upside down and release or open the valve. By this means a stream of the powder and carbonic acid gas may be projected as much as 20 ft. or more from the nozzle. Inasmuch as fire depends upon oxygen and the carbon dioxide evolved will blanket any fire, it will extinguish it almost immediately. The powder is not injurious.

Valve Regulates Boiler Feed Water Automatically

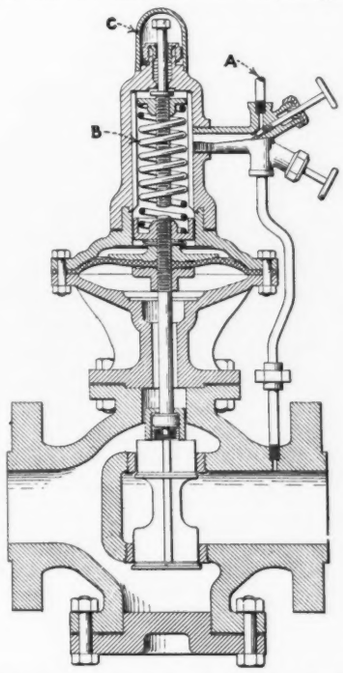
Where several boilers are supplied with feed water from one pump, controlled by a differential pressure regulator, the excess pressure on the feed line tends to vary materially at each boiler with changes in the rate of feed.

With a view to eliminating this variation in the excess pressure, an automatic regulator or control valve designed especially for installation in the line just ahead of each feed-water regulating valve has been brought out by the S. C. Regulator Co., Fostoria, Ohio. The general constructional features of the valve are shown in the illustration on page 225, which is self-explanatory.

The opening through the valve is controlled by means of a diaphragm having steam pressure on one side and feed-line pressure on the other. The steam-pressure connection is made to the valve at the point *A* and adjustment for the excess pressure desired is obtained by altering the tension on the spring *B*.

In addition to controlling the excess pressure ahead of the individual feed-

water regulating valve, the type S valve can be used in the discharge of



Type S valve for controlling feed water to boilers

an electrically driven boiler-feed pump to maintain a constant excess pressure on the feed line.

Socket Cover Designed for Portable Lamps

Designed primarily as a "safety first" device, the Protex portable socket cover shown in the accompanying illustration has a useful field in extension lamp service. In the power plant it has particular value for boiler inspection or

Portable socket cover

other work where moisture tends to increase the danger to the user from short-circuits or grounding. The handle is made of a high-grade rubber compound and is proportioned to withstand the abuses common to the service. For switchboard inspection the wire guard is insulated to prevent possible short-circuiting. Guard and socket as a unit are being supplied by the Daniel Woodhead Co., 15 North Jefferson St., Chicago.

Trade Catalogs

Electric Heat—"Electric Heat in Industry" is the title of a new, 32-page bulletin just issued by the General Electric Co. and bearing the number GEA-261. This bulletin deals with the advantages of electric heat for various industrial applications, including the metal industry, heat treating, ceramic industry, chemical industry, printing industry, finishing processes, and other similar applications. It is attractively illustrated with photographs and art work.

Alloy—The Du Pont Everdur Co., of Wilmington, Del., has issued a booklet describing Everdur metal, its new product. This is a corrosion-resistant alloy with physical properties characteristic of steel.

Pumps—The Aldrich Pump Co., Allentown, Pa., has issued a circular announcing that it has purchased all designs and manufacturing privileges covering the complete line of Earle centrifugal pumps, heretofore made and sold by the Earle Gear & Machine Co., of Philadelphia, Pa.

Switches — "Automatic Switching Equipment," is the title of a 23-page bulletin (No. GEA-295) just issued by the General Electric Co. It is well illustrated and describes the application of this equipment to railway service, hydro-electric generators, mining and industrial service, central station service, etc.

Cranes—The Link-Belt Co., Chicago, Ill., has just issued a catalog, No. 895, covering crawler cranes for various purposes. It contains 48 pages, illustrated to show the use of drag-line, dipper and trench shovel, skimmer scoop, hook blocks, and pile drivers. Data on lifting capacities, approximate operating speeds, line pull and tractive effort are included.

Scale Removal—The International Process & Engineering Corporation, 42 Broadway, New York, has issued a pamphlet describing its so-called Agfil system for removing and preventing boiler scale.

Crushers—The C. G. Buchanan Co., 90 West St.. New York, has prepared an attractive booklet covering the range of applications of its crushing equipment for distribution at the National Crushed Stone Association's Convention in Montreal.

Turbines—Curtis steam-turbine generators are covered in Bulletin GEA-54, isued by the General Electric Co.

Blowers—"ABC" pressure blowers and exhausters are covered in Bulletin 1608 (superseding No. 8, Series 6), issued by the American Blower Co., Detroit, Mich.

Floodlighting—Electric Service Supplies Co., Philadelphia, Pa., has just issued Bulletin No. 216 on "Floodlighting." It is illustrated with cuts of the latest type of floodlighting equipment built by this company, with photographs of interesting applications.

Electric Drill—Bulletin No. 108 of the Hisey-Wolf Machine Co., Cincinnati, Ohio, describes a new model, ⅝-in. capacity, standard duty, universal electric drill which is being put on the market.

Compressors — A catalog and price list of parts for its compressors, boosters and vacuum pumps has been issued by the Rix Compressed Air & Drill Co., San Francisco, Calif. It is Bulletin A. B. C. 151.

Recording Instruments — Part 4,000 of the Taylor Instrument Companies, Rochester, N. Y., which has just been issued, shows the recent developments and new models put out by these companies.

Compressors — Catalog 126 of the Pennsylvania Pump & Compressor Co., Easton, Pa., covers duplex single-stage and two-stage cross-compound air compressors (class DB and DE). Illustrated, 16 pages.

Centrifugal Compressors — Single-stage centrifugal air compressors are covered in a 4-page folder, GEA-233, issued by the General Electric Co., Schenectady, N. Y.

Hoists—The "Novo Hoisting Handbook" has been published by the Novo Engine Co., Lansing, Mich. The company states that it deals only with applications and is not a catalog.

Headlights—Mine locomotive head lights of the incandescent type, for gathering and haulage locomotives, are covered in a two-page bulletin, No. GEA-162, issued by the General Electric Co., Schenectady, N. Y.

Welding—Bulletin GEA-9 of the General Electric Co., Schenectady, N. Y., is devoted to arc welding sets consisting of a 200-amp., self-excited arc welding generator, with control, driven by a 22½-hp. four-cylinder heavy-duty Buda engine.

Ball Mills—The Hardinge Company, York, Pa., has issued Catalog No. 13A, covering Hardinge conical ball and pebble mills and their application to the field of grinding and pulverizing.

Concrete—Bulletin No. 314 of the Celite Products Co., 1,320 South Hope St., Los Angeles, Calif., is entitled "Celite — an Admixture for Concrete." Celite is composed of practically pure amorphous silica.

Heat Treatment—W. S. Rockwell Co., furnace engineers and contractors, 50 Church St., New York, have prepared for distribution a four-page bulletin (No. 269) containing a reprint of a paper entitled "Selection of Fuel for Heat-Treatment of Metal."

Industrial Control—An industrial control catalog, No. GEA-257, has been issued by the General Electric Co. It furnishes information on representative lines of industrial control manufactured by the company and includes a reprint of the industrial-control section of the company's general catalog; instructive matter on the care and operation of control devices; wiring diagrams of some standard controllers, push buttons and other accessories; reference tables; lists of publications, and other useful information. It has 160 pages.

Turbine—The type D-54 mechanical-drive turbine, intended for the driving of centrifugal pumps, blowers and other classes of mechanical drive, is described in Bulletin GEA-197, just issued by the General Electric Co., Schenectady, N. Y.

The Market Report

All Metal Markets Weaken

Copper Business Especially Dull—Zinc Slumps Under 8c. and Lead Prices Are Quotably Lower

New York, Jan. 27, 1926—Prices for all the major non-ferrous metals suffered some decline during the week ending today, with the volume of business, particularly in copper, less than in recent weeks. Neither lead nor zinc was so active as recently. Some observers believe that orders on the books of manufacturers for second-quarter delivery are slow and that this makes them hesitate about buying raw materials. On the other hand, current deliveries are excellent, and there is ample time for the forward situation to readjust itself.

Copper Breaks Through 14c.

Sales of copper during the week ending today were confined largely to last Thursday, Friday and Saturday, when substantial orders were placed at 14.125c. delivered in the Middle West and 14c. in the Connecticut valleys. Virtually all of this is for February delivery. Since Monday buyers seem to have been disinterested, though copper for any position was available at 14c. No producer had been willing to shade this figure until late today, when two large sales were closed at 13.95c. for March delivery in the East. Business abroad likewise has been dull, with some producers holding firmly at 14.30c. c.i.f., which is far above the prevailing quotation in Europe.

Premium on Spot Zinc Disappears

The feature of the zinc market is the disappearance of the premium on spot metal that has persisted for several weeks. Last Wednesday prices ranged from 8.30c. for prompt shipment to 8.10c. for March-April, whereas today 7.95c. is the market for all positions. For some time it has been expected that the foreign and domestic markets must approach each other more closely. The decline on this side has been in this direction, but as the London price has declined too, a margin still exists sufficient to prevent domestic producers from finding business abroad.

However, the statistical position remains excellent and deliveries are on a good scale. High-grade zinc in New York continues to be quoted at 10.25c. per lb. The premium on Brass Special ranges from 10 to 15 points.

Lead Prices Irregular

The continued decline in London lead prices during the week ending today had an unsettling effect on lead prices in both the New York and St. Louis market. Foreign decline was not an important one, and did not bring prices below levels that were reached in December, but it was felt that should it continue very much longer it might be necessary for American producers to revise their prices downward or allow Mexican bullion lead to be sold in this country in addition to the ore lead now being marketed here. On the other hand, domestic producers are in an excellent position; one of the largest has practically no lead left for February shipment and another important interest will only be able to take care of normal inquiries. So it may be that the United States can absorb some bullion lead from outside sources if the excellent domestic demand keeps up.

Prices in general have been at the American Smelting & Refining Co's. contract price of 9.25c., in the New York market, for all deliveries, though Middle Western producers have realized slightly more on shipments to the East. Some lead, though, has sold for forward delivery at slight concessions from this level. In the St. Louis market, prices have shown more variation than for

Daily Prices of Metals

Jan.	Copper N. Y. net refinery*	Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N.Y.	St. L.	St. L.
21	13.80	61.125	62.00	9.25	9.075@9.10	8.10@8.30
22	13.80	61.375	62.25	9.25	9.075@9.10	8.00@8.20
23	13.80	61.375	62.25	9.25	9.075@9.10	8.00@8.10
25	13.75	61.00	61.75	9.25	9.075@9.10	8.00
26	13.75	60.875	61.625	9.25	9.075@9.10	8.00
27	13.725	60.25	61.125	9.25	9.075@9.10	7.95
Av.	13.771	61.000	61.833	9.250	9.088	8.05

*The prices correspond to the following quotations for copper delivered: Jan. 21st, 22nd, 23rd, 14.05c.; 25th, 26th, 14.00c.; and 27th, 13.975c.

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for deliveries constituting the major markets, reduced to the basis of New York cash, except where St. Louis is the normal basing point, or as otherwise noted. All prices are in cents per pound. Copper is commonly sold "delivered," which means that the seller pays the freight from the refinery to the buyer's destination.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

The quotations are arrived at by a committee consisting of the market editors of *Mining Journal-Press* and a special representative of the Bureau of Mines and the Bureau of Foreign and Domestic Commerce.

London

Jan.	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic						
	Spot	3M		Spot	3M	Spot	3M	Spot	3M
21	58⅞	60	65¼	279½	275	34⅝	34½	37⅛	37 5/16
22	58¾	59⅞	65¼	281	275½	34½	34 5/16	37½	36⅞
25	58⅞	59½	65	279½	274	34¼	34	37	36 9/16
26	58½	59⅝	65	277¾	273⅝	34¼	34 3/16	37	36⅝
27	58⅜	59½	65	276	272¼	34	33⅞	36⅞	36½

The above table gives the closing quotations on the London Metal Exchange. All prices in pounds sterling per ton of 2,240 lb.

Silver, Gold, and Sterling Exchange

Jan.	Sterling Exchange "Checks"	Silver		Gold London	Jan.	Sterling Exchange "Checks"	Silver		Gold London
		New York	London				New York	London	
21	4.85¾	67	30 13/16	84s10½d	25	4.85¾	67¼	30 13/16	84s10½d
22	4.85¾	67⅛	30⅞	84s10½d	26	4.85¾	67¼	30⅞	84s10½d
23	4.85⅝	67	30⅞	....	27	4.85¾	67	30 13/16	84s10½d

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London silver quotations are in pence per troy ounce of sterling silver, 925 fine. Sterling quotations represent the demand market in the forenoon. Cables command three-eighths cent premium.

some weeks. The principal producer continues to sell at 9.10c., but small car lots for prompt delivery have sold as high as 9.30c., and one good tonnage for late February delivery has sold as low as 9c., a price which probably could not be duplicated today, though 9.05c. might be done. Corroding grades have sold at the usual premium of $2@$3 per ton.

Tin Neglected

Little interest has been exhibited in tin, and prices have ruled at substantially the same levels as those of last week. April deliveries have ruled from one-half to three-quarters cent less than prompt.

Silver Steady

There has been no change in the silver situation during the last week, China continuing to sell and India showing no particular interest as a buyer. Prices fluctuated within narrow limits, and unless some new developments arise to alter market conditions, a further decline in price is not unlikely.

Mexican Dollars: Jan. 21st, 51⅜c.; 22d, 51½c.; 23d, 51⅜c.; 25th and 26th, 51½c.; 27th, 51⅜c.

Exchanges Quiet

Foreign exchanges have generally been steady and quiet. Closing cable quotations on Tuesday, Jan. 26, were as follows: francs, 3.715c.; lire, 4.035c.; and marks, 23.81c. Canadian dollars, 3/16 per cent discount.

Other Metals

Quotations cover large wholesale lots unless otherwise specified

Aluminum—99 per cent grade, 28c. per lb.; 98 per cent, 27c. London, 98 per cent, £118 per long ton.

Antimony — Per pound, f.o.b. New York: Chinese brands, spot, 22½@22c. February arrival, 22@21c. Cookson's "C" grade, spot, 24c. Market sluggish and weak; prices largely nominal.

Bismuth—$3.30@$3.35 per lb., in ton lots. London, 12s. 6d.

Cadmium—60c. per lb. London, 1s. 9d. for Australian metal.

Iridium—$350 per oz. for 98@99 per cent. Nominal. London £80@£85 for 99.5 per cent.

Nickel—Ingot, 35c.; shot, 36c.; electrolytic, 39c. (99.75 per cent); London, £170@£175 per long ton.

Platinum—$115 per oz. refined officially quoted. Sales also at $113@$114. Crude, $112.50. The official price was changed from $120 to $115 on Jan. 21. This narrows the spread between the official and outside markets. London, £23 10s.@£25 for refined; crude, £21@£22½.

Quicksilver—Per 75-lb. flask: $87½@$88½ for spot and forward. San Francisco, $90. London, £15@£15½.

The prices of **Cobalt, Germanium Oxide, Lithium, Magnesium, Molybdenum, Monel Metal, Osmium, Palladium, Radium, Rhodium, Ruthenium, Selenium, Tellurium, Thallium, Tungsten,** and **Zirconium** are unchanged from the issue of Jan. 9.

Metallic Ores

Tungsten Ore—Per unit of WO_3, N.Y.: Wolframite, $11.50@$12.50; Western scheelite, $12.50@$13.50. Domestic demand very light, and prices largely nominal but firmly maintained. European demand good.

Chrome Ore, Galena and Pyrite Radio Crystals, Iron Ore, Manganese Ore, Molybdenum, Tantalum, and **Vanadium Ores** are unchanged from quotations in the Jan. 9 issue.

Lead Ore Higher—Zinc Blende Lower

Joplin, Mo., Jan. 23, 1926

Zinc Blende	Per Ton
High	$60.25
Premium, basis 60 per cent zinc	$55.00@$56.00
Prime Western, 60 per cent zinc	$54.00
Fines and slimes, 60 per cent zinc	$53.00@$49.00
Average settling price, all ores	$55.07
Galena	
High	$124.40
Basis 80 per cent lead	$122.50
Average settling price, all ores	$120.48

Shipments for the week: Blende, 18,661; lead, 1,588 tons. Value, all ores the week, $1,218,950.

Shippers loaded 18,600 of the 21,000 tons purchased last week, snow and near zero temperature stopping all loading for one day. The market is easy on the lower offering, and sellers are freely disposing of zinc ore.

The advance of $2.50 per ton was not sufficient to increase the tonnage of lead sold, and shipments continue low, the four weeks noting a decrease of 2,273 tons from the record of last year, when lead was selling on $130 basis price.

Production exceeded 17,700 tons this week in the face of the blizzard, with 173 mills operating, 37 of them on double shift. Overhauling of machinery and development during the holiday period when the mines were not producing is beginning to swell the output.

Platteville, Wis., Jan. 23, 1926

Zinc Blende	Per Ton
Blende, basis 60 per cent zinc	$58.50
Lead Ore	
Lead, basis 80 per cent lead	$120.00

Shipments for the week: Blende, 956 tons; lead, 40 tons. Shipments for the year: Blende, 2,636; lead, 100 tons. Shipments for the week to separating plants, 1,693 tons blende.

Non-Metallic Minerals

Fluorspar—German fluorspar is being offered on the eastern seaboard at $17.50, duty paid, for 85-5 material. This is the price asked by domestic producers for the same grade, f.o.b. mines, in Illinois and Kentucky.

Amblygonite, Andalusite, Asbestos, Barytes, Bauxite, Borax, Celestite, Chalk, China Clay, Diatomaceous Earth, Emery, Feldspar, Fuller's Earth, Garnet, Gilsonite, Graphite, Greensand, Gypsum, Ilmenite, Iron Oxide, Lepidolite, Limestone, Magnesite, Manjak, Mica, Monazite, Ocher, Phosphate, Potash, Pumice, Pyrites, Quartz Rock Crystals, Rutile, Silica, Spodumene, Sulphur, Talc, Tripoli, and **Zircon** are unchanged from prices in the Jan. 9 issue.

Mineral Products

Arsenious Oxide (White arsenic)—3@3¼c. per lb. London, £14@£15 per long ton.

Sodium Nitrate—Spot, crude, $2.67 per 100 lb., ex vessel, Atlantic ports.

Copper Sulphate, Sodium Sulphate, and **Zinc Oxide** are unchanged from prices in the Jan. 9 issue.

Ferro-Alloys

Ferrocerium, Ferrochrome, Ferromanganese, Ferrophosphorus, Ferrosilicon, Ferrotitanium, Ferrotungsten, and **Ferro-uranium** are unchanged from prices in the Jan. 9 issue.

Ferrovanadium—Per pound of V contained, f.o.b. works, $3.40@$4.

Metal Products

Rolled Copper—Sheets, 22½c.; wire, base price, 16c. per lb.

Lead Sheets—Full, 13c. per lb.; cut, 13¼c.

Nickel Silver—29¾c. per lb. for 18 per cent nickel Grade A sheets.

Yellow (Muntz) Metal — Dimension sheets, 20¼c. per lb.; rods, 17¼c.

Zinc Sheets—12c. per lb., f.o.b. works.

Refractories

Chrome Brick, Firebrick, Magnesite Brick, Silica Brick, and **Zirkite** are unchanged from prices in the Jan. 9 issue.

Steel Steady—Pig Iron Dull Coke Higher

Pittsburgh, Jan. 26, 1926

Steel market activity has not increased as much as was expected, since the lull attributed to the holidays and inventory taking. There has been a decided increase in buying of oil-country tubular goods, but in no other direction is there much change. In some lines there is more buying as old orders run out, but this does not affect shipments.

Steel prices are quite steady, but there is no stiffening tendency whatever, and possibly in a few spots there is a slightly easier tone.

Pig Iron—The market continues very dull. Consumption of foundry iron is not up to specifications. Two furnaces, allied with coke producers, are banked to release coke for sale in the East, and a furnace expected to start this month has not done so. Prices are steady and unchanged: Bessemer, $21; basic, $20; foundry, $20.50 f.o.b. Valley furnaces.

Connellsville Coke—Prices have advanced a trifle more, being $9.50@$10 for run of oven and $11@$12 for yard crushed. Operators are oversold for a few days, and offerings are light. Blast furnaces are not in the market.

Silver: Production, Consumption, and the Outlook

India and China, World's Silver Sinkholes, Took 76 per Cent of 1925 Production —Prospects Good

The lack of information covering both the amount of silver required for new coinage and the supplies of bullion made available by the melting and debasement of old coinage prevents an accurate compilation of figures showing world supply and demand, says Handy & Harman's "Review of the Silver Market for 1925." This firm has, however, prepared a table comparing its estimate for 1925 with that of 1924, all data being based upon the most reliable information available early in January:

World Supplies

In Millions of Fine Ounces

	1925	1924
Production		
United States	64.	65.4
Mexico	91	91.5
Canada	19	19.7
All other countries	64	62.5
Total production	238	239.1
Proceeds of debased coinage from England	7	2
Melted Continental coin	..	18
Total	245	259.1

World Consumption

Shipments	1925	1924
To India from the United States, Canada and Mexico	72.4	(a) 81.2
To India from England	34.1	27
To China from the United States, Canada and Mexico	52.7	(a) 39.1
To China from England	6.5	2.6
To Germany from the United States and Mexico	14.5	....
Arts and Manufactures:		
In the United States	31	28
In England	5	4.5
Coinage		
U. S. Mint under Pittman Act	....	1.1
U. S. Mint—Doré bullion for subsidiary coinage	17	3.3
Mexican Government	3.3	11.3
European countries	....	50
Other buyers:		
Origin and destination unknown	8.5	11
Total	245	259.1

(a) There were no shipments from Mexico to the Far East in 1924.

"Direct business between the United States and the Orient continues in large volume, but a new departure during 1925 was the shipment of silver by steamer from the Mexican gulf ports of Vera Cruz and Tampico to England, Germany and the Far East.

"We are also informed that large quantities of zinc concentrates containing silver, formerly refined in British Columbia, are now being exported from Canada to Belgium.

Shipments

In Millions of Fine Ounces

	1925	1924	1923	1922
New York to England	9.7	30.7	9.7	16.3
New York to India	67.7	81.2	36.7	18.2
New York to China	4.5	1.7	.1	....
New York to Germany	5.8	.3	....	....
San Francisco to China	42.6	34.6	58.5	49
San Francisco to Japan	....	2	....	.1
San Francisco to India	.7	....	....	....
San Francisco to England	2.5	4.1	....	....
San Francisco to Germany	2	1	....	....
Halifax to England	2.6	5.4	3.6	4
Halifax to India	.6	....	....	....
Vancouver to China	4.2	2.8	3.9	2.6
Mexico to England	15.7	....	....	....
Mexico to Germany	6.7	....	....	....
Mexico to India	3.4	....	....	....
Mexico to China	1.4	....	....	....
Total	170.1	163.8	112.5	90.2

Outlook for 1926

"Having reviewed facts and figures for 1925, let us now turn to the prospects for silver during the coming year. For the immediate future there is the possibility of some improvement in price toward the latter part of January and during February, due to the Indian wedding season and purchases of bullion against exports on the part of China. Beyond this time the market level of the white metal will be determined chiefly by the demand from the two great silver-using countries of the Far East. Should India be fortunate in having another favorable monsoon, we believe its requirements would at least equal those of 1924 and 1925. China has also shown remarkable buying power under the unfavorable conditions prevailing during the past year, so that too much stress should not be laid upon present political disturbances. We therefore are inclined to think that the demand from this quarter will continue.

"An accurate forecast of the coinage situation is impossible, but in our opinion it is unlikely that there will be sufficient support from European or other countries to affect the market appreciably. Variations in the amounts consumed in the arts or for commercial purposes are also too small to have any pronounced influence.

"A careful consideration of the various factors likely to affect the price of silver seems to justify the conclusion that current quotations are not high, and that the outlook for 1926 is favorable."

January Mining Dividends Show Big Increase

The following dividends were paid in January, 1926, by mining and metallurgical companies operating in North and South America:

Companies in the United States	Situation	Per Share	Total
Cresson Consolidated Gold	Colo.	$0.10 Q	$122,000
Eagle-Picher Lead, pfd., l, z	Okla., Mo.	1.50 Q	12,829
Gladstone Mountain, l	Wash.	0.005 M	6,609
Homestake Mining, g	S. D.	1.50 MX	376,740
Inland Steel, pfd	Minn.	1.75 Q	175,000
Inspiration Consolidated Copper	Ariz.	0.50 Q	590,983
Jardine Mining, g, a	Mont.	0.005 Q	10,922
Kennecott Copper	Alaska	1.00 Q	4,474,281
Magma Copper, c, s	Ariz.	0.75 Q	306,116
Newmont Mining, h	Various	0.60 Q	258,000
Nichols Copper, pfd	N. Y.	1.75 Q	40,434
Park-Utah Consolidated, s, l, z	Utah	0.15 Q	300,000
Phelps Dodge, c	U. S. and Mex.	1.00 Q	500,000
Republic Iron & Steel, pfd.	Various	1.75 Q	437,500
Silver King Coalition, s, l	Utah	0.25 Q	304,025
Sloss-Sheffield Steel & Iron, pfd	Ala.	1.75 Q	117,250
Tintic Standard, s, l, c	Utah	0.30 Y	345,874
Tomboy Gold, g, s, l	Colo.	ls.	£15,500
U. S. Smelting, Ref. & Mng., s, l	Various	$0.875 Q	$306,426
U. S. Smelting, Ref. & Mng., pfd	Various	0.875 Q	425,556
Utah-Apex, l, c, s, g	Utah	0.35 Q	184,870
Virginia Iron, Coal & Coke, pfd	Va.	2.50 SA	125,000
Companies in other countries			
Ahumada Lead, l, s	Chihuahua	0.25 Q	298,004
Asbestos Corporation	Quebec	1.50 Q	45,000
Asbestos Corporation, pfd	Quebec	1.50 Q	60,000
Consolidated Mng. & Smg., l, z, c	B. C.	5.75 SA W	2,459,378
Dome, g	Ont.	0.50 Q	500,000
Erupcion, l, s	Chihuahua	0.10 Q	125,000
Frontino & Bolivia Gold	Colombia	3d.	£1,750
Hollinger Consolidated Gold	Ont.	$0.08 4 weeks	$393,605
Howe Sound, c, l, s	B. C.	0.50 Q	198,410
Mining Corporation, s	Ont.	0.125 Q	207,506
N. Y. & Honduras Rosario, g, s	Honduras	0.50 Q	100,000
Nipissing, s	Ont.	0.15 Q	180,000
Premier Gold, s, g	B. C.	0.08 Q	400,000
San Francisco of Mexico, l, z, s	Chihuahua	2s. 6d.	£169,195
Silversmith, s, l, z	B. C.	$0.02 Q	$50,000
Wright-Hargreaves, g	Ont.	0.10 Q	275,000
Total			$14,587,318

Q, quarterly; M, Monthly; X, includes $1 extra; Y, extra; SA, semiannually, W, includes $5 extra; l, lead; z, zinc; g, gold; a, arsenic; c, copper; h, holding; s; silver.

Mining dividends distributed to stockholders in January were greater by about $4,200,000 than those paid for the last corresponding quarter in October, and were more than $5,000,000 greater than were paid in January, 1925. Chiefly responsible for the increase was the melon cut by the Consolidated Mining & Smelting Co. of Canada, which paid out a bonus of $5 per share, though the regular dividend is only $3 a year. As the stock is selling for about $186 a share, and earnings have been far greater than the dividend, it was expected that some additional distribution would be made, though to pay a huge sum as an extra, and leave the regular dividend rate untouched, is unusual. Homestake paid an extra of $1 per share, the same as this famous property did in January of last year, and apparently the stockholders may expect $7 per year as long as present conditions persist. This is a good yield, as the stock sells for $50, but the end of the mine is apparently in sight. Kennecott raised its dividend from 75c. per share quarterly to $1, an advance that was not unexpected, as the company is making handsome profits on 14c. copper, assisted by its holdings in other companies. U. S. Smelting increased its common dividend to 87½c. a share, the common now paying the same as the preferred. Silversmith paid 2c. instead of the customary 1c., and Wright-Hargreaves 10c. per share instead of 5c. Erupcion was the only company to take a backward step in the matter of dividends, reducing its distribution from 15 to 10c. per share.

Control of Diamond Industry Re-enacted for Five Years

The leading South African diamond producers have renewed the interproducers' agreement which has governed their quotas of sales to the London Diamond Syndicate for a number of years, according to D. C. Poole, in the Jan. 11 issue of *Commerce Reports*. The quotas in the new agreement are unchanged from those previously ruling, giving 51 per cent of the sales to the De Beers Consolidated Mines, Ltd.; 18 per cent to the Premier Diamond Mining Co., Ltd.; 10 per cent to Jagersfontein, and 21 per cent to the Consolidated Diamond Mines of South West Africa. This agreement, accompanied by the new contract with the London Diamond Syndicate, has now been submitted to the South African government for approval, which, it is generally considered, is assured, as the government constantly has been in touch with developments. When the formal action has been taken it is probable that a public announcement will be made.

This reorganization of the selling arrangements of the principal producers appears to have put an end for at least five years to the disagreements which have threatened since 1923 to disrupt the organization of the industry. It appears also to have removed for a similar period the possibility of the South African government's taking over the direct control of the output and sales of diamonds under the so-called Diamond Control Act, which became law during the summer session of the Union Parliament. The arrangement, which has now been completed, is the culmination of long-continued efforts and is of great importance to both producers and consumers of diamonds in all parts of the world.

South African Interests Protected

The diamond-control bill was intended to protect South African interests from the suspected manipulations of the diamond market by London investors. Official interference in the production and marketing of diamonds was not made mandatory, but the government was given the power to interfere whenever this seemed desirable in the public interest. The bill was amended during its passage through Parliament so as to encourage private agreements among producers to which the government could give its approval and thereby the force of law. If, as stated in the well-informed although unofficial circles, the government has been kept informed as the new arrangements were worked out, it is most probable that the law will remain inoperative for an indefinite time. It appears, however, to have served its purpose in confronting the various interests with an imperative need to come together if direct government control were to be avoided.

The new syndicate is the strongest which the diamond industry has known, both in the extent of productive areas whose output it will control and the financial resources of its members. It will have the disposal of the output of all the important mines in the Union of South Africa proper and of the Consolidated Diamond Mines of South West Africa, Ltd., in the mandated territory. It will also control the output of the alluvial diggings of Angola and the Belgian Congo.

The sources of supply not under its control will include the alluvial diggings of South Africa, certain small mines in southwest Africa, and the production of British Guiana, Brazil, and other regions. Estimates indicate that the world's annual consumption of diamonds now approaches £13,000,000, of which the syndicate may control as much as £10,000,000.

The contract which has been made between the syndicate and the producers is similar in principle to the arrangements heretofore existing, but embodies a scale of prices more favorable to the producer. The diamonds will be sold to the syndicate at a figure based upon the market price of diamonds during the preceding six months, a readjustment taking place at the end of each such period. The syndicate will bear any losses and take the whole of any profit realized up to a certain figure. When the profit exceeds this it will be divided between the syndicate and the producers in a fixed proportion.

This contract will run for five years from Jan. 1, 1926, and it is hoped that it can be indefinitely extended. The obvious effect will be to stabilize the world price of diamonds and possibly to increase it.

Company Reports

Utah-Apex Earned $1,056,441 During Fiscal Year

The annual report to the stockholders of the Utah-Apex Mining Co. for the fiscal year ended Aug. 31, 1925, shows profits for the year, before providing for depletion and federal income taxes, amounting to $1,056,441.

The dispute with the Utah Delaware Mining Co. originated, the report says, at a most inopportune moment. As a consequence of this dispute, mining in important orebodies was suspended, thus reducing ore production and, consequently, profits. Among orebodies in which mining has been impeded by it, is an important copper deposit on the 2,400 level, the proceeds from which would have appreciably increased receipts. Owing to the controversy the management has been unable to carry out plans to speed up production at the rate of the best months of the year, which would have meant not only the realization of proportionately increased profits, but the still greater profits resulting from reaping the full benefit of the existing high lead market.

Ore production during the year shows an increase of 30 per cent over the previous record of the company, and an increase of 63 per cent in the gold, 45 per cent in the silver, and 20 per cent in the lead content of the ore. Totals for the year are as follows: Ore mined, 244,293 tons; concentrates produced, 38,847 tons; metal content—gold, 8,854 oz.; silver, 906,189 oz.; lead, 45,828,820 lb.; copper, 3,989,081 lb.; zinc, 19,384,081 lb.

The long-sought solution of the problem of profitable recovery of the zinc content of ores and concentrates is finally in sight. For this purpose the necessary additions and improvements in the mill have been completed. Henceforth, instead of being penalized, the zinc content will be an added source of income.

Profit-and-Loss Account for the Year Ended Aug. 31, 1925

Debit

Mining and milling expenses:		
Mining	$1,351,542.21	
Development	415,958.75	
Milling	139,372.37	
		$1,906,873.33
Insurance		77,536.74
General expenses		110,218.70
Taxes		18,573.02
Depreciation		30,312.87
Balance carried down		1,043,160.41
		$3,186,675.07
Additional Federal income tax for 1918		$1,679.15
Balance, being profit for the year, before providing for depletion and Federal income tax		1,054,762.02
		$1,056,441.17

Credit

Proceeds of sales of ore, after deducting smelting charges and expenses	$3,128,250.89
Lease royalties	9,388.67
Interest, discounts and miscellaneous receipts	49,035.51
	$3,186,675.07
Balance brought down	$1,043,160.41
Sundries	13,280.76
	$1,056,441.17

Gladstone Mountain Net Income $201,052 for 1925

A surplus of $110,246 at the end of 1925 is shown in the report of the Gladstone Mountain Mining Co., mining lead ore to the east of Northport, Wash. This is an increase of $25,000 to $30,000 over the surplus at the same period a year ago, and in the interim $66,100 in dividends has been paid.

Net income was $201,052, of which $199,804 was received in net smelter returns. Expenses were $90,805, of which $59,920 was on operating account, $23,701 for hauling, $4,240 for overhead, and $2,100 was charged off as depreciation.

Freight Rates on Metals, Ores, and Concentrates

Carload Lots

Copper Bullion and Refined Copper

From	To	Rate per Ton of 2,000 Lb. All Rail	Via Gulf
El Paso, Tex.	Baltimore, Md.	$11.40	$10.00
Garfield, Utah	Perth Amboy	12.50	.....
Garfield, Utah	San Francisco	5.85	.....
Hayden, Ariz.	Perth Amboy	14.50	12.50
Miami, Ariz.	Perth Amboy	14.50	12.50
Anaconda, Mont.	Perth Amboy	12.50	.....
Butte, Mont.	Perth Amboy	12.50	.....
Humboldt, Ariz.	Chrome, N. J.	14.50	12.50
Douglas, Ariz.	Perth Amboy	14.50	12.50
Globe, Ariz.	Perth Amboy	14.50	12.50
Clifton, Ariz.	Perth Amboy	14.50	12.50
Clarkdale, Ariz.	Chrome, N. J.	14.50	12.50
Via Southern S.S. Co. or Morgan Line		.....	$9.40
Copperhill, Tenn.	Laurel Hill, N. Y.	$10.80	.....
Tooele, Utah	Chrome, N. J.	12.50	.....
McGill, Nev.	Baltimore, Md.	12.90	.....
Houghton, Mich.	New York	9.60	.....
Hancock, Mich.	New York	9.60	.....
Hubbell, Mich.	New York	9.60	.....
Dollar Bay, Mich.	New York	9.60	.....
Tacoma, Wash.	New York Conference rate		$6.00
Via Canal			
Anaconda, Mont.	Tacoma, Wash.	7.09	.....
Ajo, Ariz.	New York	14.50	$12.50

Marine Freight Rates

New York to
- Hamburg: $4.50 per gross ton copper and lead
- Liverpool: 5.50 per gross ton copper and lead
- Antwerp: 4.00 per gross ton copper and lead
- Havre: 4.75 per gross ton lead; 5.00 per gross ton copper

Gulf ports to
- Hamburg: $4.50 per gross ton copper and lead
- Liverpool: 5.50 per gross ton copper and lead
- Antwerp: 4.00 per gross ton copper and lead
- Havre: 5.00 per gross ton copper

Pacific coast ports to
- Hongkong: $6.00 per short ton copper and lead
- Kobe: 6.00 per short ton copper and lead

Lead Bullion (Pig Lead Where Shown)

From	Rates per Ton of 2,000 Lb. To New York	To St. Louis
East St. Louis, Ill.	$7.00	.....
Pueblo, Colo.	12.50	$9.00
Leadville, Colo.	12.50	9.00
East Helena, Mont	12.50	9.50
El Paso, Tex.	10.00 Via Gulf	
	12.00 All Rail	7.00
Omaha, Neb.	9.60	3.65
Murray, Utah	12.50	9.00
Midvale, Utah	12.50	9.00
Tooele, Utah	12.50	9.00
East Chicago, Ill.	6.40	(a) 1.60
Kellogg, Idaho	13.50	9.50
Carnegie, Pa.	3.80	(a) 5.00
Selby, Calif.	(b) 6.00	.....
Herculaneum, Mo.	(a) 8.80	(a) 1.80
Federal, Ill.	7.00	(a) 1.80
Collinsville, Ill.	7.00	(a) .75½
Granby, Mo.	(a) 10.50	(a) 3.50
Joplin, Mo.	(a) 10.50	(a) 3.50

(a) Pig lead only.
(b) Conference rate, via canal.

Slab Zinc

From	Rates per Net Ton to E.St. Louis	New York
Donora, Pa.	(a) $4.60	$3.80
Langeloth, Pa.	(a) 4.60	3.80
Palmerton, Pa.	7.10	3.00
Hillsboro, Ill.	1.40	7.00
Danville, Ill.	1.60	6.40
La Salle, Ill.	1.60	6.70
Springfield, Ill.	3.00	7.00
Cleveland, Ohio	5.80	5.00
Moundsville, W. Va.	4.40	3.80
Van Buren, Ark.	3.80	10.80
Fort Smith, Ark.	3.80	10.80
Bartlesville, Okla.	3.50	10.50
Blackwell, Okla.	3.80	10.80
Henryetta, Okla.	3.80	10.80
Sand Springs, Okla.	3.80	10.80
Cherryvale, Kan.	3.50	10.50
Black Eagle, Mont.	9.40	12.50
Park City, Utah	9.00	12.50
Amarillo, Tex.	5.80	12.80

(a) To St. Louis, Mo.

Zinc Ores and Concentrates

To	From	Rate per Net Ton
Bartlesville, Okla.	Altoona, Kan.	$2.10
	Pittsburg, Kan.	1.09
	Galena, Kan.	1.30
	Joplin, Mo.	1.40
	Iola, Kan.	1.09
	Baxter, Kan.	1.50
	Miami, Okla.	1.40
	Quapaw, Okla.	1.40
	Kansas City, Mo.	1.60
Sand Springs, Okla.	Miami, Okla.	2.20
	Quapaw, Okla.	2.20
	Galena, Kan.	1.50
	Joplin, Mo.	1.50
	Iola, Kan.	2.40
Dewar, Okla.	Cave Springs, Mo.	2.00
	Cent City Spur, Mo.	2.00
	Chitwood, Mo.	2.00
Kusa, Okla.	Galena, Kan.	1.50
Henryetta, Okla.	Iola, Kan.	2.40
	La Harpe, Kan.	2.40
La Harpe, Kan.	Mound City, Kan.	.50
	Oswego, Kan.	.50
	Parsons, Kan.	.50
Coffeyville, Kan.	Galena, Kan.	1.10
	Joplin, Mo.	1.22
Bartlesville, Okla. (a)	Baxter, Kan.	1.80
	Miami, Okla.	1.80
	Quapaw, Okla.	1.80

(a) Lead ore and concentrates.

Rates on Ores and Concentrates

From	To	Value of Product: $5	$10	$15	$20	$25	$30	$35	$40	$50	$60	$70	$75	$80	$90	$100
		Rate														
Butte, Mont.	Anaconda, Mont.	.22	.22	.22	.22	.22	.22	.22	.22	.22	.22	.22	22	.22	.22	.22
Butte, Mont.	Black Eagle, Mont. (a)	....	....	....	....	....	....	....	1.01	....	....	....	....	....	....	1.01
Great Falls, Mont.	East Helena, Mont.	....	....	1.57	....	1.76	....	1.98	....	2.43	....	....	....	....	....	2.55
Butte, Mont.	East Helena, Mont.	....	....	1.17	....	1.46	....	1.69	....	2.03	....	....	....	....	....	2.14
Paxton, Calif.	Salt Lake Smelters, Utah	....	....	....	....	....	....	....	....	*5.50	*6.00	*6.70	....	*7.40	*8.10	*8.80
Johannesburg, Calif.	Selby, Calif.	....	....	....	2.90	....	3.50	....	4.10	4.70	5.30	5.90	....	6.50	6.80	7.10
Johannesburg, Calif.	Humboldt, Ariz.	....	....	....	3.40	....	4.10	....	4.80	5.50	6.20	6.90	....	7.60	8.00	8.30
Pioche, Nev.	Humboldt, Ariz.	....	4.50(c)	7.74	....	8.55	....	9.36	....	9.99	....	....	11.25	....	....	12.42
Creede, Colo.	Durango, Colo.	....	....	3.25	3.50	3.75	4.00	....	4.25	4.75	5.25	5.75	6.05	....	....	7.10
Ouray, Colo.	Durango, Colo.	....	....	4.30	4.80	....	5.05	....	5.50	5.90	....	6.30	....	....	....	7.70
Telluride, Colo.	Durango, Colo.	....	....	....	....	....	4.30	....	5.00	5.50	6.00	6.3	....	6.60	7.10	7.70
Silverton, Colo.	Durango, Colo.	....	....	1.40	1.40	....	....	2.20	....	....	....	....	....	2.30	2.55	2.80
Tyrone, N. M.	Douglas, Ariz.	....	....	1.60	1.90	....	2.20	....	2.50	2.80	....	..	3.10	....	....	3.40
Tyrone, N. M.	El Paso, Tex.	....	....	1.60	1.90	....	2.20	....	2.50	2.80	....	..	3.10	....	....	3.40
Lordsburg, N. M.	Douglas, Ariz.	....	1.00	1.30	1.60	....	1.90	....	2.20	2.50	....	....	2.80	....	....	3.40
Lordsburg, N. M.	El Paso, Tex.	....	1.00	1.30	1.60	....	1.90	....	2.20	2.50	....	....	2.80	....	....	3.40
Tombstone, Ariz.	Douglas, Ariz.	....	....	.60	....	.90	....	....	....	1.30	....	....	1.60	....	....	1.90
Tombstone, Ariz.	El Paso, Tex.	....	1.60	1.90	....	2.50	....	....	....	3.80	....	....	4.40	....	....	4.40
Silver City, N. M.	Douglas, Ariz.	....	....	2.48	....	3.15	....	....	....	3.83	....	....	....	....	....	5.29
Ray Junction, Ariz.	Hayden, Ariz.	....	.10	....	.40	....	.50	....	.80	.90	....	....	1.00	....	....	1.10
Sandon, B. C. / Alamo Concentrator, B. C.	Tadanac, B. C.	1.50	1.60	1.70	1.90	2.00	2.50	....	2.60	2.90	3.40	3.50	....	3.70	3.80	3.90
Rossland, B. C.	Tadanac, B. C.	.90	.90	1.00	1.00	1.10	1.10	....	1.60	1.60	1.60	1.70	....	1.70	1.70	1.70
Rossland, B. C.	Tadanac, B. C(d).	.30	.30	.30	.30	.50	.70	....	.80	.80	....	....	....	....	....	....
Republic, Wash.	Tadanac, B. C.	....	2.11	2.56	2.66	2.86	3.84	....	3.84	3.84	4.69	4.89	....	5.19	5.39	5.59

(a) Minimum tonnage of 200 tons per day. (b) In open cars, minimum 80,000 lb. (c) Siliceous ore tailing.
(d) Applicable on ore, only when shipped in trainload lots of not less than 10 cars and exclusive of switching charges at Rossland.

From	To	Value of Ores and Concentrates: $10	$15	$20	$25	$30	$35	$40	$50	$60	$70	$75	$80	$90	$100
		Rate													
Burke, Idaho (a) (d)	Bradley, Idaho	....	....	....	....	....	....	....	....	.68	....	.....	....	....	1.02
Burke and Wallace, Idaho	East Helena, Mont.	....	....	....	....	3.00	....	3.25	3.50	3.75	4.00	.....	4.25	4.50	4.75
Sagel, Idaho	East Helena, Mont.	....	....	....	3.38	....	3.83	....	4.16	....	....	.....	....	.....	4.84
Arizona Tunnel, Idaho	Bradley, Idaho	....	....	....	....	....	....	....	....	.35	....	.....	....	.....	.50
Bayview, Idaho	Bradley, Idaho	....	....	....	....	....	....	....	3.75	....	....	4.37½	....	.....	5.12
Park City, Utah	Salt Lake Smelters	1.00(e)	1.10	1.25	....	1.50	....	1.75	....	2.00	....	.....	2.25	.....	2.50½
Eureka, Utah	Salt Lake Smelters	1.00	....	1.25	....	1.50	....	1.75	2.00	2.25	2.50	.....	2.75	3.00	3.25
Tintic, Utah	Salt Lake Smelters	1.00	....	1.25	....	1.50	....	1.75	2.00	2.25	2.50	.....	2.75	3.00	3.25
St. Johns, Utah	Salt Lake Smelters	1.00	....	1.25	....	1.50	....	1.75	2.00	2.25	2.50	.....	2.75	3.00	3.25
Ophir, Utah	Salt Lake Smelters	1.00	....	1.25	....	1.50	....	1.75	2.00	2.25	2.50	.....	2.75	3.00	3.25
Bingham, Utah	Garfield, Utah	....	.40	....	.75	....	....	....	.95	....	....	1.10	....	....	1.25
Cherry Creek, Nev.	Garfield, Utah (c)	....	....	4.60	....	5.10	....	5.60	6.10	6.60	7.10	.....	7.60	8.10	8.60
Cherry Creek, Nev.	Garfield, Utah (b)	....	....	3.20	....	3.90	....	4.60	5.30	6.00	6.70	.....	7.40	....	....
Goldfield, Nev.	Salt Lake Smelters	....	4.15	5.10	....	5.80	....	6.50	7.20	7.90	8.60	.....	9.30	10.00	10.70
Battle Mountain(a)	Salt Lake Smelters	....	....	*3.20	....	*3.80	....	*4.40	*5.00	*5.60	*6.20	.....	*6.80	*7.40	*8.00
Palisade, Nev. (a)	Salt Lake Smelters	....	2.90	3.20	....	3.80	....	4.30	4.80	5.30	5.80	.....	6.30	6.80	7.30
Mina, Nev. (a)	Salt Lake Smelters	....	....	3.60	....	4.30	....	5.00	5.70	6.40	7.10	.....	7.80	8.50	9.20
Lovelock, Nev. (a)	Salt Lake Smelters	....	....	3.20	....	3.90	....	4.60	5.30	6.00	6.70	.....	7.40	8.10	8.80
Golconda, Nev. (a)	Salt Lake Smelters	....	....	3.20	....	3.90	....	4.60	5.30	6.00	6.70	.....	7.40	8.10	8.80
Hazen, Nev. (a)	Salt Lake Smelters	....	....	3.20	....	3.90	....	4.60	5.30	6.00	6.70	.....	7.40	8.10	8.80
Tonopah, Nev.	Salt Lake Smelters	....	4.15	5.10	....	5.80	....	6.50	7.20	7.90	8.60	.....	9.30	10.00	10.70
Rogerson, Idaho	Salt Lake Smelters	3.00	....	3.50	....	4.00	....	4.50	5.00	5.50	6.00	.....	6.50	7.00	7.07
Georgetown, Colo.	Leadville, Colo.	....	....	3.50	....	3.75	....	4.00	5.00	5.00	5.80	.....	5.80	5.80	5.85

(a) Minimum weight, marked capacity of car used, but not less than 80,000 lb. (b) Minimum weight, 80,000 lb. (c) Minimum weight, 40,000 lb.
(d) Crude ore for concentration, 30c. per ton.
(e) For $9 value rate is 95c.; $8 values, 90c.; $7 value, 85c.; $6 value, 80c.
*Indicates a change of tariff since Sept. 12.

Current Prices of Mine Materials and Supplies

Rise and Fall of the Market

Seventy-two of a total of eighty-two items in the accompanying list of mine materials and supplies, showed no price fluctuations during the first month of the new year. Steam packing, sodium cyanide, and flotation oil advanced in price, while a downward tendency developed in railroad spikes, steel plates, wire nails, linseed oil, and dynamite.

SHEETS—Quotations are per 100 lb. in various cities from warehouse also the base quotations from mill:

Blue Annealed	Pittsburgh, Large Mill Lots	St. Louis	Chicago	San Francisco	New York
No. 10	$2.50	$3.60	$3.50	$3.85	$3.89
Black No. 28	3.35	4.60	4.10	4.80	4.35
Galvanized No. 28	4.60	5.70	5.25	6.00	5.35

STEEL RAILS—The following quotations are per ton f.o.b. Pittsburgh and Chicago for carload or larger lots:

	Pittsburgh Current	Pittsburgh One Year Ago	Birmingham	Chicago
Standard bessemer rails	$43.00	$43.00	$43.00	$43.00
Standard openhearth rails	43.00	43.00	43.00	43.00

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Pittsburgh Current	Pittsburgh One Year Ago	Chicago	St. Louis	San Francisco	Birmingham
Standard spikes, ⅝-in. and larger	$2.80	$2.90	$3.55	$3.65@3.75	$4.35	$2.95
Track bolts	3.90@4.15	3.75@4.00	4.55	4.25@4.35	5.85	4.05
Standard section angle bars	2.75	2.75	3.40	3.25@3.75	4.00	3.85

STRUCTURAL MATERIAL—Following are base prices f.o.b. mill, Pittsburgh and Birmingham together with quotations per 100 lb. from warehouses at places named:

	Pittsburgh, Mill	Birmingham Mill	New York	Dallas	St. Louis	Chicago	San Francisco
Beams, 3 to 15 in.	$1.90@2.00	$2.05	$3.34	$4.15	$3.25	$3.10	$3.30
Channel, 3 to 15 in.	1.90@2.00	2.10	3.34	4.15	3.25	3.10	3.30
Angles, 3 to 6 in., ¼ in. thick	1.90@2.00	2.10	3.34	4.15	3.25	3.10	3.30
Tees, 3 in. and larger	1.90@2.00	2.10	3.34	4.15	3.35	3.10	3.30
Plates	1.85@1.90	2.00	3.34	4.15	3.25	3.10	3.30

WIRE ROPE—Discounts from list price, f.o.b. New York and east of Missouri River, on regular grades of bright and galvanized are as follows:

Cast steel round strand rope	20%
Galvanized steel rigging and guy rope	7½%
Round strand iron and iron tiller	5%
Plow steel round strand rope	35%
Special steel round strand rope	30%
Galvanized iron rigging and guy rope	+12½%

	New York	Cleveland	Chicago
Drill Rod (from list)	50@60%	55%	60%

WROUGHT PIPE—The following discounts are to jobbers for carload lots at Pittsburgh mill:

	Inches	Steel Black	Steel Galv.	Inches	Iron Black	Iron Galv.
BUTT WELD—	⅛ to 3	62	50½	⅛ to 1½	30	13
LAP WELD—	2½ to 6	59	47½	3 to 6	28	13

STEEL PIPE—From warehouses at the places named the following discounts hold for steel pipe:

	Black New York	Black Chicago	Black St. Louis
2½ to 6 in. lap welded	48%	51%	46%

CAST-IRON PIPE—The following are prices per net ton for carload lots:

	New York Current	New York One Year Ago	Birmingham	Chicago	St. Louis	San Francisco
6 in. and over	$50.60@52.60	$55.60@56.60	$41.00@42.00 base	$50.20@51.20	$48.00	$51.00

NUTS—Semi-finished, ½x½-in., 2c. each. Discount 70% for ⅝-in. and smaller; 65% for ¾-in. and larger. Case hardened, 6c. each, less 50%.

HOLLOW TILE—Price per block in carload lots to contractor for hollow building tile.

	New York Current on Trucks	New York One Year Ago	Chicago	Philadelphia	St. Louis	San Francisco	Perth Amboy N. J., Factory
4x12x12	$0.1112	$0.1162	$0.075	$0.12	$0.07	$0.108	...
6x12x12	.1667	.1743	.09¢	.....	.095	.156	$0.252*
8x12x12	.2084	.2179	.135	.22	.132	.244	.312†

* 10x12x12; † 12x12x12.

MACHINE BOLTS—½x1½-in., per 100, $1.70. Discount at New York warehouses on all sizes up to 1x30-in., 40%.

LUMBER—Prices of rough Douglas Fir No. 1 common, in carload lots to dealers at yards in San Francisco. To contractors, $2 per M. ft. additional.

	6-8 and 12 Ft.	10-16-18 and 20 Ft.	22 and 24 Ft.	25 to 32 Ft.
3x3 and 4	$26.00	$27.00	$28.00	$31.00
3x6 and 8	26.00	27.00	28.00	31.00
4x4-6 and 8	26.00	27.00	28.00	31.00

Wholesale prices to dealers of long leaf yellow pine. To contractors in New York City, delivered from lighters or cars to job, $5 additional.

	New York 20 Ft. and Under	New York 22-24 Ft.	Chicago 20 Ft. and Under	Chicago 22-24 Ft.
3x4 to 8x8	$46.00	$47.00	$42.00	$43.00
3x10 to 10x10	51.00	52.00	47.50	48.50
3x12 to 12x12	57.00	58.00	57.50	58.50

Other Cities	8 x8-In. x 20 Ft. and Under Pine	Fir*	Hemlock	Spruce	12 x 12-In. 20 Ft. and Under Pine	Fir*
Boston	$51.00	$48.00†	$51.00	$50.00	$61.00	$58.00†
Cincinnati	37.00	73.00	73.00	85.00	48.00	77.00
Denver	.....	32.75	33.75	33.75	.....	49.50
Minneapolis	42.00	37.75	35.00	.....	44.50	37.75
Kansas City, Mo.	44.50	40.75	.....	.....	59.50	41.75
Philadelphia	56.00	34.00	37.00	43.00	65.00	34.00

*Douglas fir. † Prime.

NAILS—The following quotations are per keg from warehouse:

	Pittsburgh, Mill	Chicago	San Francisco	Dallas	St. Louis	Montreal
Wire	$2.65	$3.15	$3.40	$4.25	$2.93	$4.95
Cut	2.80	....	5.00	5.00	3.13	5.00

PORTLAND CEMENT—Prices to contractors per bbl. in carload lots *without bags*. Cash discount not deducted.

	Current	One Month Ago	One Year Ago
New York, del. by truck	$2.50@2.70	$2.50@2.70	$2.50@2.60
Chicago, f.o.b.	2.10	2.10	2.10
Cleveland, f.o.b.	2.29	2.29	2.39

LIME—Warehouse prices:

	Hydrated, per Ton Finishing	Hydrated, per Ton Common	Lump, per Barrel 280-lb. net Finishing	Lump, per Barrel 280-lb. net Common
New York	$18.20	$12.@13.10	$3.50	$2.25@$2.75
Chicago	20.00	18.00	....	(180-lb. net) 1.30

LINSEED OIL—These prices are per gallon:

	New York Currant	New York One Year Ago	Chicago Current	Chicago One Year Ago
Raw in barrel (5 bbl. lots)	$0.89½	$1.17	$0.90	$1.25

WHITE AND RED LEAD—In 100-lb. kegs, base price in cents per pound:

	Dry Current	Dry 1 Yr. Ago	In Oil Current	In Oil 1 Yr. Ago
Red	15.25	15.75	16.75	17.25
White	15.25	15.75	15.25	15.75

HOSE—Quotations at New York warehouses:

Fire Protection — 50-Ft. Lengths

Underwriters' 2½-in. coupled, single jacket ..... 71c per ft.

Air—Best Grade

¾-in., per ft. ..... 3 ply $0.37½ 4 ply $0.46

Steam—Discounts from List

First grade ..... 30–10% Second grade ..... 40% Third grade ... 40–10%

RUBBER BELTING—List price 6-in., 6 ply, $1.83 per lin.ft. for rubber transmission belting.

Best grade ..... 50% Second grade 50–10%

LEATHER BELTING—List price, 24c. per lin.ft. per inch of width for single ply at New York warehouses:

Grade	Discount from list
Medium	40%
Heavy	30–10%

RAWHIDE LACING—For cut, best grade, 50%, 2nd grade, 60%. For laces in sides, best, 41c. per sq.ft.; 2nd, 37c. Semi-tanned: cut, 50%; sides, 41c. per sq.ft.

PACKING—Prices per pound:

Rubber and duck for low-pressure steam, ½ in.	$1.05
Rubber sheet	.60
Rubber sheet, wire insertion	.85

MANILA ROPE—Per lb., ¾-in. and larger, 1,200-ft. coils.

Atlanta	$0.30	New Orleans	$0.24½
New York	.27	Seattle	.24
Chicago	.24½	San Francisco	.24

EXPLOSIVES—Prices per pound of dynamite in small lots:

	Gelatin 40%	Gelatin 60%
New York	$0.265	$0.2875
Minneapolis	.1917	.2123
Denver	.2025	.2275
Seattle	.165	.19
Cincinnati	.22	.245
New Orleans	.233	.26
San Francisco	.1625	.1925

FLOTATION OIL—

Pine tar, 50 gal. bbl., gross weight 500 lb., f.o.b. New York, carload lots, per gal. $0.38

CHEMICALS—

Zinc dust, 550 lb. casks, f.o.b. works, per lb.	$0.09@.10
Litharge, f.o.b. New York, kegs, per 100 lb.	15.25
Sodium cyanide, 220 lb. single case lots, f.o.b. works, per lb.	19@.22
Calcium carbide, in drums, f.o.b. works, per lb.	.05½@.06

Mining Stocks—Week Ended January 23, 1926

Stock	Exch.	High	Low	Last		Last Div.
COPPER						
Anaconda	New York	47½	46½	47½	Ja.16,Fe.23,Q	0.75
Arcadian Consol.	Boston	*75	*70	*65		
Ariz. Com'l	Boston	12	11	11½	Jy.21, Jy. 31 SA	0.50
Calaveras	N. Y. Curb	4	3½	4		
Calumet & Arizona	New York	59	58½	59	De.4, De.21 QX	1.50
Calumet & Hecla	Boston	59½	58½	59	Nov.30,De.15 Q	0.50
Cerro de Pasco	New York	60¼	57½	60⅞	Ja. 14, Fe. 1, Q	1.00
Chile Copper	New York	34	33	33⅝	Dec.2, Dec.28, Q	0.62½
Chino	New York	18½	18⅛	18⅜	Sept., 1920	0.37½
Con. Coppermines	N. Y. Curb	2	1⅞	1⅞		
Copper Range	Boston	18⅛	18	18⅛	May, 1925	1.00
Crystal Copper	Boston Curb	*56	*44	*48		
East Butte	Boston	3½	3½	3½	Dec., 1919	0.50
First National	Boston Curb	*20	*18	*18	Feb., 1919	0.15
Franklin	Boston	1½	1	1		
Granby Consol.	New York	20½	18½	18⅜	May, 1919	1.25
Greene-Cananea	New York	12⅛	11¼	11⅜	Nov., 1920	0.50
Hancock	Boston			*80		
HoweSound.new,r.t.c.	New York	31¼	29½	29⅞	Ja. 5, Ja. 15 Q	0.50
Inspiration Consl.	New York	24⅜	23½	24	De.17, Ja.4, Q	0.50
Iron Cap	Boston Curb	2½	2½	2½	May, 1923	0.15
Isle Royale	Boston	11½	11	11	No.30, De.5	1.00
Jerome Verde Dev.	N. Y. Curb	1⅜	1⅛	1⅛		
Kennecott	New York	54⅝	54	54⅜	De.4,Jan.2 Q	1.00
Lake Copper	Boston	1	1	1	June, 1925	0.50
Magma Copper	New York	42	40½	42	De.31, Ja.15,	0.75
Mason Valley	N. Y. Curb			2		
Mass Consolidated	Boston	*50	*50	*50	Nov., 1917	1.00
Miami Copper	New York	12⅛	11⅛	11⅛	Feb.1, Feb.15 Q	0.25
Mohawk	Boston	33	31½	33	Jan. 30, Mar. 1	1.00
Mother Lode Coa.	New York	7½	7	7	De. 11, De. 31	0.37½
Nevada Consol.	New York	12⅜	12⅛	12⅜	De. 18, De.31 Q	0.25
New Cornelia	Boston	20½	20	20	Fe.5, Fe.23 Q	0.30
North Butte	Boston	3¼	3	3	Oct., 1918	0.25
Ohio Copper	N. Y. Curb	*70	*63	*65	No. 14, De. 2	0.05
Old Dominion	Boston	17⅞	16½	17½	Dec., 1918	1.00
Phelps Dodge	Open Mar.	†121	†120		De.21, Ja.2 Q	1.00
Quincy	Boston	20½	18⅞	18⅞	Mar., 1920	1.00
Ray Consolidated	New York	12	11⅛	11⅞	Dec., 1920	0.25
Ray Hercules	N. Y. Curb			14		
St. Mary's Min. Ld.	Boston	34	33½	33½	May, 1925	3.00
Seneca Copper	New York	8⅜	8⅛	8⅜		
Shannon	Boston	*60	*55	*55	Nov., 1917	0.25
Shattuck Arizona	New York	65	61	61¼	Jan.,‡1920	0.25
Superior & Boston	Boston	*85	*75	*80		
Tenn. C. & C.	New York	14½	13⅞	14⅛	De.31, Ja.15,Q	0.25
United Verde Ex.	N. Y. Curb	28	27⅝	28	Ja.5, Fe.1, Q	0.75
Utah Copper	New York			98	De.18, De.31, Q	1.25
Utah Metal & T.	Boston	*85	*75	*80	Dec., 1917	0.30
Victoria	Boston			*35		
Walker Mining	Salt Lake	1.40	1.05	1.15		
NICKEL-COPPER						
Internat. Nickel	New York	43⅛	41	42⅜	De.17,De.31,Q	0.50
Internat. Nickel, pfd.	New York			102⅞	Ja.25, Fe.1, Q	1.50
LEAD						
Gladstone M. M. Co.	Spokane	*34½	*31½	*32	Ja. 1, Ja. 10 M	0.0½
National Lead	New York	168	163¾	163¾	De.11, De.31 Q	2.00
National Lead pfd.	New York	116	116	116	Aug.21, Se.15	1.75
St. Joseph Lead	New York	44	43½	44	De.10,De.20QX	1.50
ZINC						
Am. Z. L. & S.	New York	9	8⅝	9	May., 1920	1.00
Am. Z. L. & S, pfd.	New York	46⅞	38½	39	Nov., 1920	1.50
Butte C. & Z.	New York	5⅜	5⅛	5⅛	De.10, De.24	0.50
Butte & Superior	New York	15	13⅜	13⅛	De.15, De.31 Q	0.50
Callahan Zn-Ld	New York	2⅜	2⅜	2⅛	Dec., 1920	0.50
Eagle Picher	Cincinnati	35	33½	34⅜	De.1. De.31	0.40
Eagle Picher, pfd.	Cincinnati			110	Ja. 1, Ja. 31	1.50
New Jersey Zn.	N. Y. Curb			208	No.20,Dec.10 X	2.00
United Zinc	N. Y. Curb			*70		
Yellow Pine	Los Angeles	*30	*25	*28½	Se.10 Se.21 Q	0.04
GOLD						
Alaska Juneau	New York	1⅞	1⅝	1⅞		
Argonaut	Toronto	*20	*18	*18½		
Barry-Hollinger	Toronto	*25	*19	*24½		
Carson Hill	Boston			*41		
Consol. W. Dome L.	Toronto	*23½	*22	*22½		
Cresson Consol. G.	N. Y. Curb	2⅛	2⅛	2⅛	De.31, Ja. 7	0.10
Crown Reserve	Toronto	*20⅜	*18	*19	Jan., 1917	0.05
Dome Mines	New York	17⅜	16⅜	17	De.31, Ja.20, Q	0.50
Golden Center	N. Y. Curb	2⅛	1⅞	1⅞		
Golden Cycle	Colo. Springs	†1.60	†1.56		No. 30, Dec.10 Q	0.03
Hollinger Consol.	Toronto	19.90	18.35	18.95	Ja. 12, Ja. 28	0.08
Homestake Mining	New York	51	49	50	Ja.20, Ja.25XM	1.50
Kirkland Lake	Toronto	1.07	*90	1.08		
Lake Shore	Toronto	11.35	10.75	11.35	De.1,De.15 XQ	0.10
McIntyre-Porcupine	New York	24⅛	23½	24⅛	Fe.1, Ma.7	0.05
Newray	Toronto	*44	*41	*42½		
Night Hawk Pen.	Toronto	*10	*9	9½		
Noranda	N. Y. Curb	16	14⅛	*16		
Portland	Colo. Springs	†*64	†*61		Oct., 1920	0.01
Rand Mines	New York	34	33½	34	Au.17, Au.25	1.52
Teck-Hughes	Toronto	3.57	3.15	3.22	Ja. 15, Fe. 1	0.05
Tom Reed	Los Angeles	*60	*55	*55	Ma.10Ma. 20	0.02
Tough-Oakes	Toronto	*53½	*51	*51		
United Eastern	N. Y. Curb			*45	July, 1924	0.05
Vipond Cons.	Toronto	2.00	1.77	1.95		
Wright-Hargreaves	Toronto	8.50	8.15	8.30	De.15, Ja. 1 QX	0.10
Yukon-Alaska Trust	N. Y. Curb			27		
GOLD AND SILVER						
Carnegie Metals	Pittsburgh	16⅞	16½	16½		
Con. Cortez	N. Y. Curb	*6	*6	*6		
Con. Virginia	San Francisco	*33	*29½	*30½		
Continental Mines	N. Y. Curb			*45		
Dolores Esperanza	N. Y. Curb	*80	*67	*67	July, 1923	0.05
Premier Gold	N. Y. Curb	2⅜	2 3/16	2 5/16	De.18, Ja. 4	0.08
Tonopah Belmont	N. Y. Curb	4½	3	4⅛	Se.15, Oc.1	0.05
Tonopah Extension	N. Y. Curb	1 1/16	1⅛	1 1/16	Apr. 1925	0.05
Tonopah Mining	N. Y. Curb	6	5¾	6	Se.30, Oc.21	0.07½
Unity Gold	N. Y. Curb			*20		
West End Consol.	N. Y. Curb			*25	Mar., 1923	0.05
Yukon Gold	N. Y. Curb	*50	*50	*50	June, 1918	0.02

Stock	Exch.	High	Low	Last		Last Div.
SILVER						
Alvarado	N. Y. Curb	1	1	1	Oct., 1920	0.50
Beaver Consol	Toronto	*65	53	*65	May. 1920	0.03
Castle-Trethewey	Toronto	1.59	1.57	1.58		
Coniagas	Toronto	4.30	4.00	4.00	May, 1924	0.12½
Keeley	Toronto	1.91	1.68	1.79	Ma. 1,Ma.15 X	0.12
Kerr Lake	N. Y. Curb	1⅛	1⅛	1⅛	Oc. 1, Oc.15 Q	0.12½
La Rose	Toronto	*36	*31	*35	Apr., 1922	0.10½
Lorrain Trout Lake	Toronto	1	1	1	Jy. 2, Jy. 15	0.05
McKinley-Dar.-Sav.	Toronto	*25	*23	*24	Oct., 1920	0.03
Mining Corp. Can.	Toronto	3.52	3.40	3.48	Ja. 16, Ja.30	0.12½
Nipissing	N. Y. Curb	6⅞	6½	6⅞	De.31, Ja.2, Q	0.15
Temiskaming	Toronto	*13	*13	*13	Jan., 1920	0.40
SILVER-LEAD						
Ahumada	New York	8¼	7⅛	7⅛	De.15,Ja.2, X	0.25
Alta Merger	Salt Lake	†9	†2			
Bingham Mines	Boston	52½	51	52	De.19, De.20 Q	1.00
Cardiff M. & M.	Salt Lake	†60	†55		De.16, No.18	0.10
Chief Consol	Salt Lake	3.75	3.75	3.75	Fe. 1,	0.10
Emma Silver	Salt Lake	1½	1	1½		
Erupcion	Boston Curb	1⅜	1⅜	1⅜	De.15, Ja.2, X	0.10
Federal M. & S.	New York	103	90	90	No.25, De.15 Q	1.75
Federal M. & S., pfd.	New York	96⅜	92⅛	92½	Au.25, Se.15	1.75
Hawthorne Mines	N. Y. Curb	*20	*18	*19		
Hecla Mining	N. Y. Curb	18	17⅜	17⅞	No.15, De.15 Q	0.50
Iron King Mining	Salt Lake	*35	*35	*35		
Keystone Mining	Salt Lake	*53	*43	*52	Au.12, Au.26	0.07½
Lucky Jim	Spokane	*13⅜	*13⅜	*13⅜		
Mammoth Mining	Salt Lake	2.90	2.90	2.90	De. 16, De. 23	0.10
Marsh Mines	Spokane	*11⅜	*11	*11	Se.15, Oc.1	0.15
Ontario Silver	New York	10	10	10		
Park Utah	Salt Lake	7.80	7.75	7.75	Se.15, Oc.1	0.15
Prince Cons	Salt Lake	3½	3	3½		
Silver King Coal	Salt Lake	9.65	9.40	9.40	De.15, Ja.2, QX	0.35
Silversmith	Spokane	*41⅛	*39½	*39½	De.31, Ja.10	0.02
Tamarack-Custer	Spokane	*53	*40	*50	Sept., 1924	0.25
Tintic Standard	Salt Lake	13.50	13.00	13.25	De.16,De.23,QX	0.30
Utah-Apex	Boston	7⅛	7⅛	7 1/16	Ja.1, Ja.5, Q	0.35
Western Utah Copper	N. Y. Curb			*10		
IRON						
Bethlehem Steel	New York	48⅛	46½	47⅞	July, 1924	1.25
Colorado Fuel & Iron	New York	36	34½	34⅞	May, 1921	0.75
Gt. North'n Iron Ore	New York	25⅜	25⅛	25¼	De. 4, De. 28,	0.75
Inland Steel	New York	42½	41	42	No.13, De.1 Q	0.62½
Mesabi Iron	N. Y. Curb			2		
Replogle Steel	New York	14⅜	14	14		
Republic I. & S.	New York	69⅞	56¼	58⅜	May, 1921	1.50
Republic I. & S. pfd.	New York	944	93	93½	Ma.15, Ap.1, Q	1.75
Sloss-Sheffield S. & I.	New York	125½	120½	124⅜	De.10, De.21 Q	1.50
Sloss-Shef. S.&I. pfd.	New York	102	100½	102	De.21, Ja.2, Q	1.75
U. S. Steel	New York	135⅛	131⅞	134⅛	No.28, De.30 XQ	1.75
U. S. Steel pfd.	New York	127	126⅛	127	No. 3, No. 28, Q	1.75
Virginia I. C. & C.	New York	43	41	43	Jan., 1924	1.50
Virginia I.C.&C.pfd	New York			77	De.15, Ja.2,	2.50
VANADIUM						
Vanadium Corp.	New York	31⅜	30⅛	30½	Fe.1, Fe.15, Q	0.50
ASBESTOS						
Asbestos Corp	Montreal	90¾	88½	89½	De.31, Ja.15 Q	1.50
Asbestos Corp., pfd.	Montreal	115	113	113	De.31, Ja.15, Q	1.50
SULPHUR						
Freeport Texas	New York	24⅞	22	23½	Nov., 1919	1.00
Texas Gulf	New York	124⅝	120⅜	123½	De.1, De.15,QX	2.75
DIAMONDS						
De Beers Consol	New York	29	28⅜	29	Ja.26, Fe.2	0.23
PLATINUM						
So. Am. Gold & P.	N. Y. Curb	4⅛	4	4		
MINING, SMELTING, REFINING AND GENERAL						
Amer. Metal	New York	53⅛	51⅛	52⅛	No. 20, De. 1, Q	1.00
Amer. Metal pfd	New York	116⅜	116⅜	116⅜	No. 21, De. 1, Q	1.75
Amer. Sm. & Ref.	New York	138⅜	130½	132⅜	Ja.15, Fe.1,	1.75
Amer. Sm.&Ref.pfd.	New York	115⅛	114⅜	115⅜	Fe.5,Ma .1, Q	1.75
Consol. M. & S.	N. Y. Curb	186½	186½	186½	De.31, Ja.15	0.75
Federated Metals	N. Y. Curb			18		
Newmont Mining	N. Y. Curb	54	49½	52⅞	De.31, Ja.15,	0.60
Southwest Metals	N. Y. Curb			2		
U. S. Sm. R. & M.	New York	47	45¼	45½	Ja.1, Ja.7, Q	0.87½
U.S. Sm. R.&M.pfd.	New York	49⅜	48⅛	48½	Ja.1, Ja.7, Q	0.87½

* Cents per share. † Bid or asked. Q, Quarterly. SA, Semi-annually. M, Monthly. K, Irregular. I, Initial. X, Includes extra. The first date given is that of the closing of the books; the second that of the payment of the dividend.

Boston quotations courtesy Boston Stock Exchange; Toronto quotations those of the Standard Stock Exchange of Toronto, by courtesy of Arthur E. Moysey & Co.; Spokane, Pohlman Investment Co.; Salt Lake, Stock and Mining Exchange and George H. Watson & Co.; Colorado Springs, Colorado Springs Stock Exchange.

LONDON QUOTATIONS, WEEK ENDED JANUARY 9, 1926

	High	Low	Last	Date	Per Cent
Aramayo Mines (25 frs.)	81/3	80/—	80/—	Nov. 1925	5(c)
British Platinum	7/6	6/7½	7/—	Feb. 1925	2½
Burma Corpn. (10 rupees)	19/4½	18/9	19/—	Feb. 1926	6 annas.*
Bwana M'Kubwa	8/4½	7/9	8/1½		
Camp Bird	5/—	4/6	5/—		
El Oro	5/10½	5/7½	5/9	Nov. 1924	2½*
Esperanza	—/10	—/8	—/9		
Frontino & Bolivia	8/1½	7/6	7/6	Jan. 1926	1½
Mexican Corporation	23/6	21/6	23/		
Mexican Mines of El Oro	31/3	30/7½	31/—	Dec. 1925	12½*
Nechi (pref. 10s.)	1/6	1/—	1/6	1921–22	25
Oroville Dredging	4/—	3/9	4/—	Dec. 1923	3½
Ouro Preto	2/9	2/6	2/9	May 1925	2½
St. John del Rey	11/—	10/6	10/6	June 1925	6½
San Francisco Mines	32/4½	28/6	31/6	Jan. 1926	22½
Santa Gertrudis	22/9	21/—	22/6	July 1920	5
Selukwe (2s. 6d.)	12/9	11/9	12/3	April 1917	6¾
S. American Copper	5/4½	5/—	5/3	Nov. 1917	75
Tanganyika	49/3	46/—	46/10½	Sept. 1925	5
Tomboy	4/9	4/6	4/6	Sept. 1925	5
Union Minière du Haut-Katanga (Brussels) 100 Fr.	6.775	6.505	6.650	July 1925	150(b)

* Free of British income tax. (b) Belgian francs. (c) Swiss francs.